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This Week in The IRON AGE

Vol. 155, No. 17 April 26, 1945

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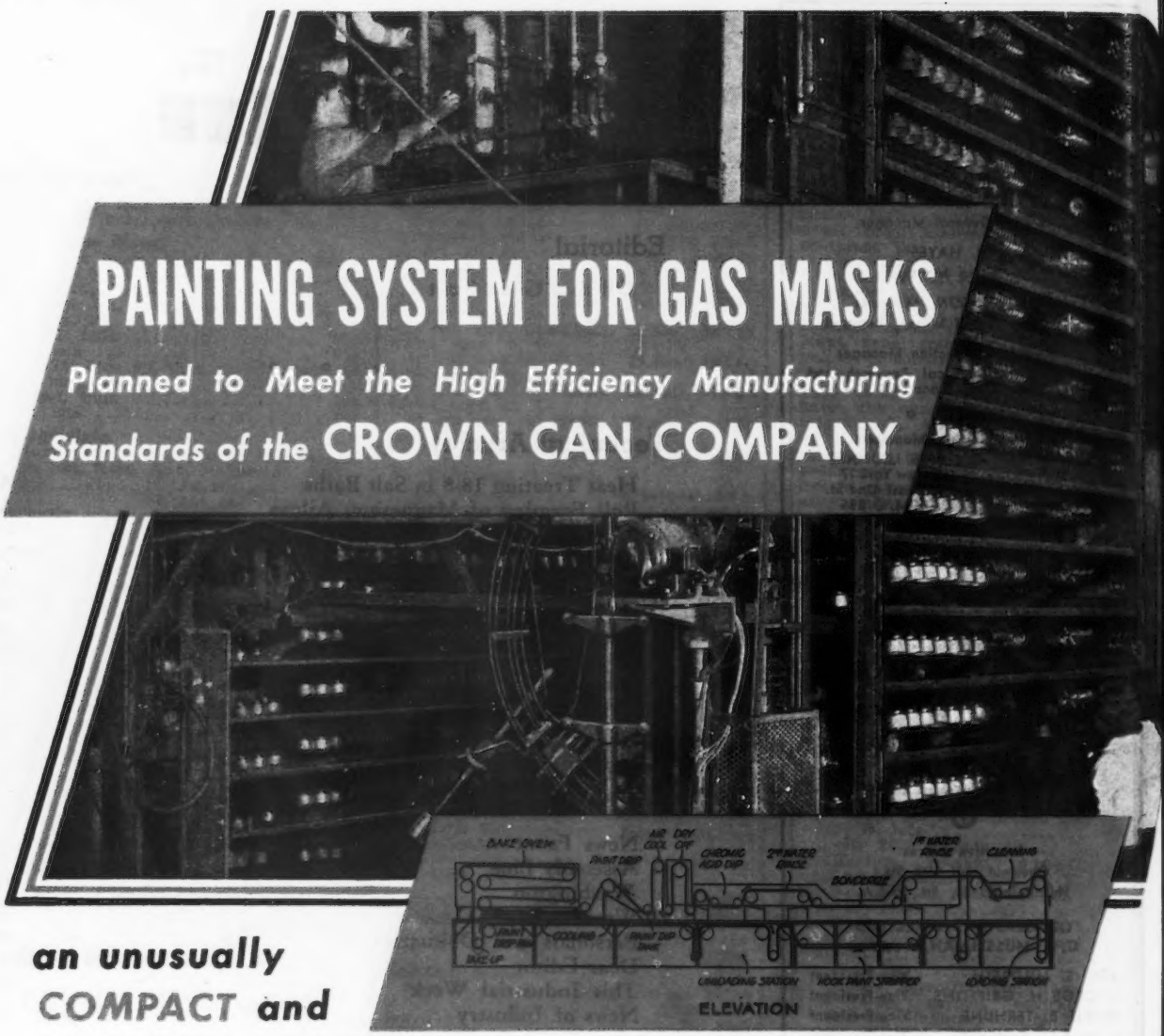

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The
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April 26, 1945

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Off to a Good Start

BY and large, most Americans like to be helpful. This even includes, with some exceptions, traffic cops. One of them stopped traffic on Broadway in New York City not too long ago to let a mother cat escort her brood of kittens across that busy thoroughfare.

It is encouraging to see this spirit of helpfulness extended to our new President. I do not think that there is any group or class of people in our country who would willingly put a stone in his difficult way, but on the contrary most of us would be only too glad to help remove the stumbling blocks.

His predecessor was a very great man. Some of us differed with him as to certain policies and actions and did not hesitate to express these differences. I think we felt that his ability to cope with criticism was so great as to make his actions immune from what might have impeded lesser men.

President Truman has been thrust into the toughest job on earth. It is as if one of us were asked suddenly to assume the presidency of General Motors or the National City Bank, except that his problem is a thousand times larger and more difficult.

Our new Chief Executive has made a good start and a good impression. He has approached his task in a humble spirit that invites help and cooperation. And business and industry can do no less and will do no less than give him the most sincere help of which they are capable.

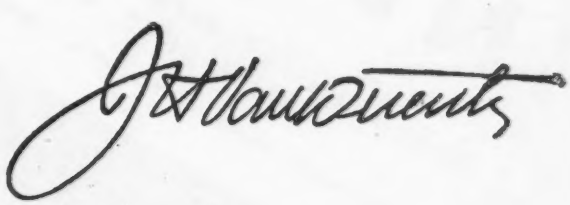
I think that under President Truman's regime there can be a forgetting of bygone differences and a uniting in a common purpose. God help us if there should not be.

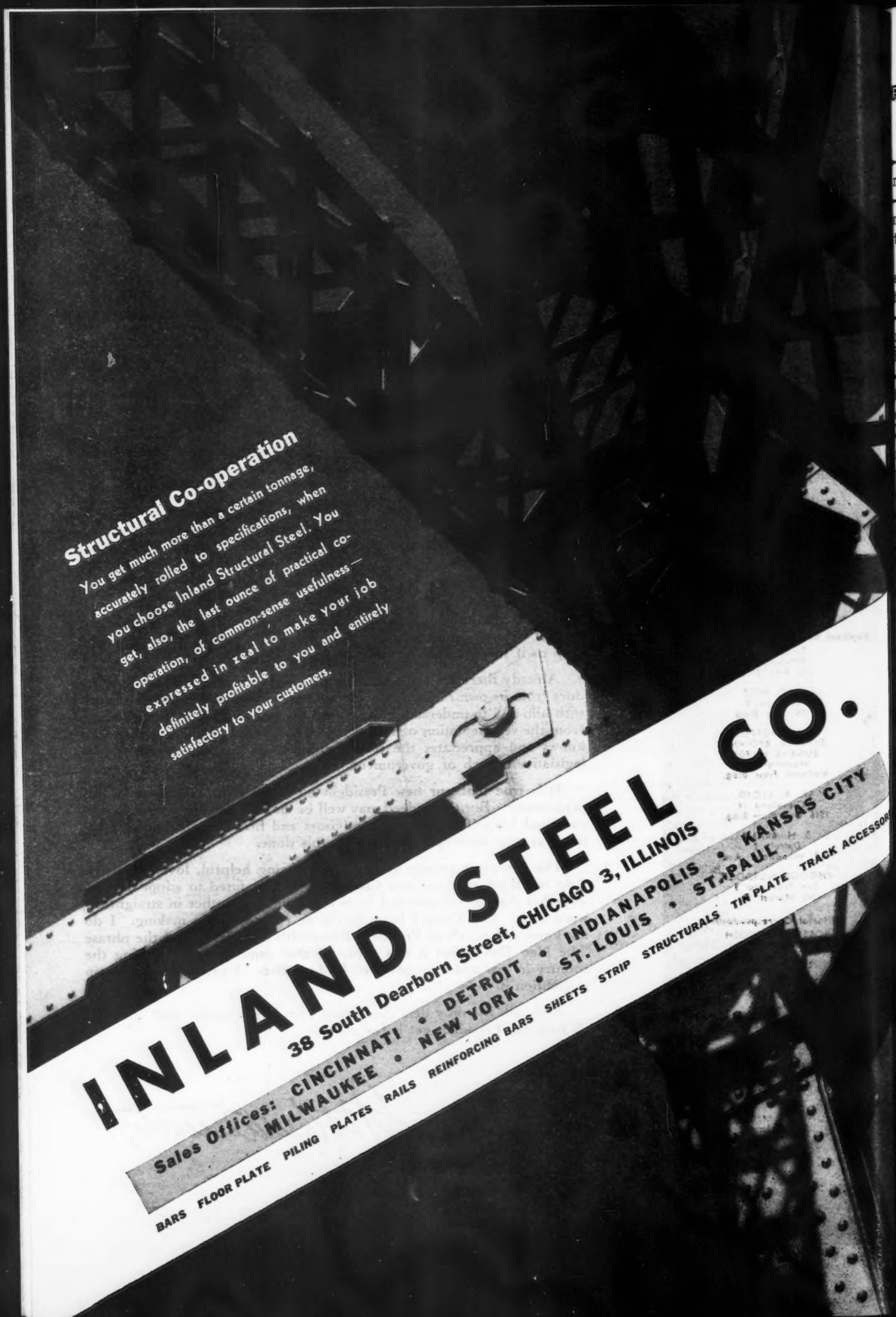
Already there are signs that indicate such a uniting. Coming as he does from its own ranks, Congress will be in mood and position to work with him and to understand him. And by the same token, as we emerge from the regimentation of war, it is well to have at the helm a man who knows and appreciates the responsibilities and the capabilities of the legislative branch of government.

It is true that our new President lacks the long experience of his predecessor. But this indeed may well be an asset for knowing it he will surround himself with the best advisors and heed their council. I believe, as time develops, we shall see this done.

The American people in addition to being helpful, love simplicity. I do not think that our new Chief is by nature fitted to adopt devious ways but that he will proceed from one point to another in straightforward lines. One thing I hope for, is an end to phrase making. I do not know just which of President Roosevelt's advisors coined the phrase "the New Deal," but it was a phrase that came near to splitting the country in two and may now well be forgotten. I promise never again to mention it.

After all, the only deal Americans want is the square deal and let's all help the President get it for us.

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The IRON AGE
April 24, 1945

NEWS FRONT

Captured Japanese tires, made of rubber from captured East Indian plantations, are being widely used on Allied Army vehicles on the Pacific battlefront.

Development of newly discovered extensive iron ore reserves in Labrador is under way. M. A. Hanna Co. is associated with Hollinger Consolidated Gold Mines, Ltd., in the development.

Said to resemble deposits in the Lake Superior region, the ore is reported to be of an average grade of 62 per cent combined iron and manganese. All but one of the deposits are said to be of Bessemer quality.

Small steel firms, 30 in number, are endeavoring to hurry price increases promised by OPA. They fear that modified increases which might be applied after VE-Day will not suffice to protect their financial position.

The Reciprocal Trade Agreements Act is expected to be passed by Congress if the President does not insist on the inclusion of the clause permitting tariffs to be decreased by 75 per cent, instead of 50 per cent under present law.

Victory of the Foremen's Association of America in the Packard plant is interpreted in some quarters as a loss for the union, as its majority has decreased since a ballot was first taken in March 1943.

Initial postwar steel demand may be between 65 and 70 million ingot tons, according to Walter S. Tower, president of the American Iron and Steel Institute. One steel company estimates a 30 year average demand of 54 million ingot tons.

Steel companies disagree on the proper method of disposal of government owned steel mills, according to a report being made by the Senate Subcommittee on War Contracts.

Increasing pressure for reduction of the West Coast raw steel price differential will come from a coastwide steel committee which has been formed and will meet in the near future.

The trend of aircraft cutbacks will be to further emphasize super-bomber, long range fighter, and jet and rocket fighter production, with the elimination of several models now in "limited production" imminent. Production schedule on the B-80 is described as "unprecedented".

Much of Detroit's aircraft effort will be cut to permit the automobile industry to get away to as fast a start as possible.

Official estimates show that with aircraft and shipbuilding combined, 100,000 West Coast workers will be laid off within the next 90 days. Peak employment in these two industries was approximately 860,000 in the West.

The automobile industry will be ready to make cars by midsummer. As soon as materials problems are shaken down, modest allocations will be earmarked for auto output. Thereafter the auto industry's reincarnation will come as fast as present takeready is completed.

Willow Run will wind up its B-24 production by stages, to be completed by August. Layoff of 21,000 men there will also involve 9,000 others at River Rouge, Lincoln, and Highland Park Ford plants.

Increased contracts from Canadian aluminum plants are being interpreted in the Pacific Northwest as reflecting official Washington feeling that the DPC western plants are doomed.

Speculation on how soon intercoastal shipping of steel will be resumed leans toward the view that the beginning will be some time in the future. For this reason steel men see little change in the method of getting steel supplies to the West Coast until the Japanese War is well on its way to an ending.

Some planning will be necessary to prevent bottlenecks in coast-to-coast shipments of war materials and other urgently needed items after VE-Day. It may be that embargoes will be imposed and steel customers and their suppliers notified to get as much material as possible to the West Coast before the heavy rail military movement begins. The latter is a definite probability because of the expected jamming of the Panama Canal.

Heat Treating 18-8 Stainless In Salt Baths

. . . Investigation for a suitable molten salt bath to be operated at a high temperature for the annealing of welded 18-8 stainless steel and the removal of welding flux, has resulted in the selection of pure sodium carbonate which has great stability, ease of operation and from an economic standpoint is eminently satisfactory over a variety of the barium chloride types.

By KEITH WHITCOMB
Chief of Electrochemical Section
Ryan Aeronautical Co., San Diego

o o o

ONE of the ever present problems confronting the designers of a high powered aircraft engine is the necessity for conveying the high temperature exhaust gases away from the engine as quickly as possible. These gases emerge from the engine ports at a temperature between 1650 and 1800 deg. F. and must be conducted away from the engine rapidly in order to prevent the burning of the cowling, engine nacelle and other surrounding structures. One of the few metals which has proved completely satisfactory for this job is stainless steel. The success of stainless steel in performing this important function has accounted for its greatly expanded use in the aircraft industry.

The Ryan Aeronautical Co., San Diego, has an important manufacturing division devoted entirely to the mass production of aircraft exhaust manifold equipment (Figs. 1 and 2). In addition to equipment for the removal of exhaust gases, the Ryan company manufactures equipment in which utilization is made of these gases for wing de-icing, gun installation heating, warming of surface controls and cabins, and for turbosupercharging.

Exhaust manifold parts are made from sheets of columbium or titanium stabilized stainless steel of the basic 18-8 type with modifications of finish and composition specified by the laboratory. These sheets are cut, stamped into half sections and tack welded. They are then trimmed and seam welded by either atomic hydrogen or oxyacetylene methods. After this welding operation the parts must be annealed to remove the strains set up in the metal by the welding. This eliminates the possibility of failure in the critical area adjacent to the weld and also modifies the grain structure in the weld melt itself. The weld flux must be loosened by a de-fluxing process in an acid bath, and then removed by sandblasting. Ordinarily, the schedule for these operations is:

Operation	Time
1—De-fluxing in an acid tank	15 min.
2—Removal of flux by sandblasting	2 min. per part
3—Annealing heat treatment by air furnace	12 min.
4—Removal of scale by pickling in hot acid bath	30 min.

These steps require 59 min. for the process alone not including handling time. Also, several of these steps are relatively expensive to maintain. Sandblasting, for example, is rather an expensive industrial process. In the search for better methods of mass producing exhaust manifold equipment at reduced costs, the research department began a series of experiments. The result of these experiments has been to produce a new and completely successful method for the annealing of 18-8 stainless steel and the removal of welding flux. This process is faster and more economical than the former method, and patent applications on this innovation have been made by the company.

Early in the course of the investigations it was decided that the simplest and most economical method for meeting the requirements would be by the use of molten salt bath for annealing, followed by a cold pickle acid

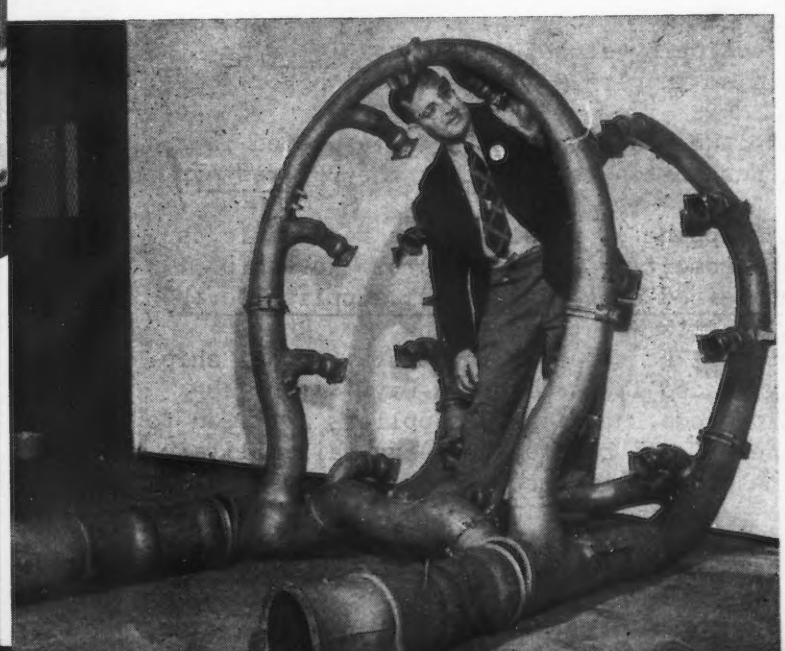

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FIG. 1—Ryan exhaust manifold collector, ball and socket type, for 18 cylinder twin-row engine with front and rear exhaust outlets. This assembly incorporates a provision for dual turbosupercharger operation.

o o o

bath. Such a salt must have several important characteristics:

1—It must have a viscosity at operating temperature which is low enough to permit low drag out to save time and cost.
2—It must react with the flux, to dissolve it.
3—It must provide a uniform oxide scale of a type easily removed by pickling.
4—It must have a low enough melting point and a degree of stability which will permit it to be safe for employees and the parts to be processed.

Several salt solutions have been on the market for heat treatment of ferrous steels. One of these salts, pure barium chloride, was recommended as being capable of operating at the temperatures required without appreciable decomposition. Since the parts are of stainless steel, with high corrosion resistance, the process of rectification was deemed unnecessary.

Selection of Electrodes

In Fig. 3 is shown the electrically heated salt bath that was installed, the furnace itself being a well insulated tank lined with tile. The salt is heated by passing a low voltage alternating current through it by means of metal electrodes which are immersed in the molten salt. The furnace was designed to operate at temperatures ranging from 1950 to 1980 deg. F. When the furnace was first operated it immediately became apparent that pure barium chloride has many disadvantages for use with stainless steel. It decomposes quite appreciably at 1950 deg. F. As a matter of fact, damaging quantities of chlorine gas were liberated by the bath for the first three or four weeks it was in operation. After this length of time the unrectified bath proceeded to dissolve material at the grain boundaries of the cast electrodes which were originally provided with the installation. At the end of 26 days, the first set of electrodes failed completely. Another set was installed and it too succumbed to the corrosive action of the unrectified salt within a few days. The furnace was then shut down and a series of experiments were conducted with various metals to get a suitable electrode material. Finally, a set of 3-in. round forged bars of Inconel were welded on to the arms of the electrodes in place of the cast stubs. These wrought bars have been in use for a good many months now and show no signs of wear. A metallographic examination of the material after 90 days indicated that penetration along the grain boundaries had progressed only about ⅛ in.

After overcoming the bothersome problem of finding the proper electrode material, there still remained another important disadvantage, namely, that parts treated by the bath eventually became scrap material. The day after the heat treating and pickling processes, the parts would exhibit a rusty and pitted surface. In an effort to save them, they were sandblasted to remove the rust and remaining salt, but after a few days of

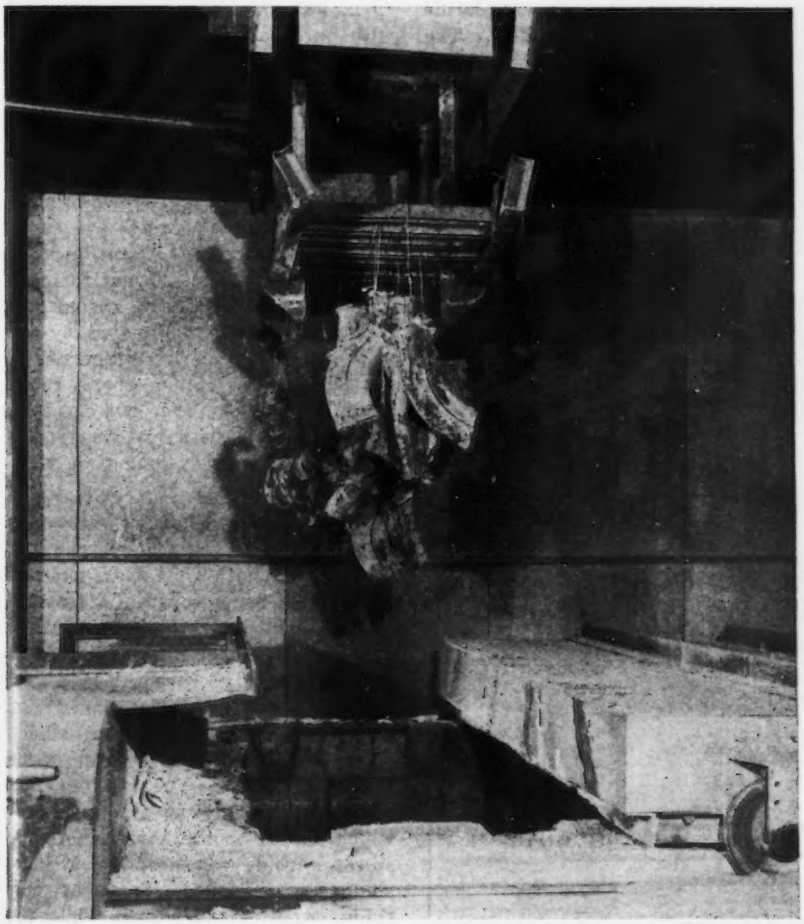

FIG. 3—Molten salt bath furnace at the Ryan Aeronautical Co. Furnace is covered by a rolling lid. The quench tank is located in the foreground. Loading device is about to immerse a group of exhaust manifold parts in bath.

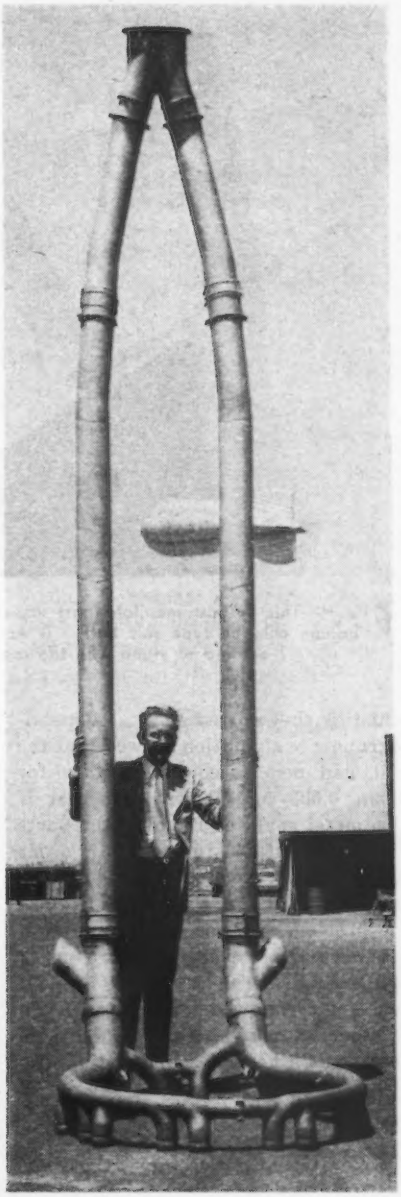

FIG. 2—Another type of exhaust manifold made of stainless steel having a single turbosupercharger outlet.

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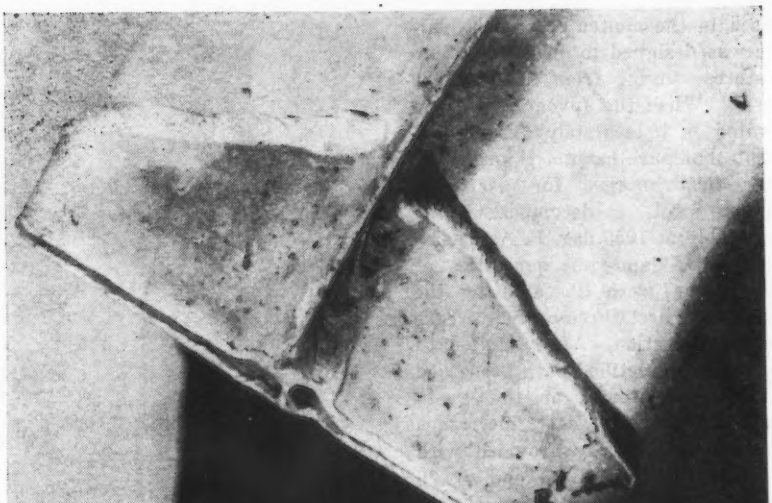


FIG. 4—This exhaust manifold part was badly corroded after a heat treatment by barium chloride type salt bath. It was sandblasted to remove the corrosion and allowed to stand with the result that each tiny pore rusted.

standing they rusted again. A metallographic examination showed that the salt had penetrated the surface for about 0.003 in. It was felt that if this metal could be removed the parts would be suitable for use. In order to effect this removal the parts were scaled at 1980 deg. F. and pickled, but the problem was not solved. After a few weeks from every tiny pore, crack and scratch there oozed rust (Fig. 4). The problem was then to learn whether or not *any* salt was suitable for use as a heat treating medium for 18-8 stainless steel.

Several Salts Studied

Several commercial producers of heat treating salts were contacted and samples of their salts operating between 1650 and 2000 deg. F. were obtained. Each was heated to a temperature of 1750 deg. F. in either an Inconel or stainless steel pot by means of a circular gas fired furnace. Samples of stainless steel were then immersed in the salts for varying lengths of time and either quenched in water or allowed to cool in air. In order to determine whether or not pickling was absolutely necessary, some samples were pickled and others were not.

These salts were all either pure barium chloride or barium chloride with other compounds added. The general properties of each salt such as fuming tendencies, mobility, sludge formation and so on, were observed. Stainless steel samples were sectioned and examined metallographically to determine the extent of attack, if any. Determinations from these tests were as follows:

Pure barium chloride: When first heated, this salt liberated chlorine gas as mentioned before. No difference was observed whether it was heated electrically or by gas. No considerable amount of sludge was formed if the salt was not rectified. During the first few hours of operation, the salt came off quite easily on quenching in water, but by the second day it became very tenacious and extremely difficult to remove. Parts treated in this medium rusted badly if every trace of salt was not removed within a very short time after treatment. At first, intergranular attack on the steel was relatively small, but as the bath becomes contaminated with the oxide of barium, the intergranular attack increased markedly.

After the bath had run for 24 hr. without rectification, sodium chloride was added in rather large amounts. A great amount of white, acrid smoke, apparently sodium oxide, was evolved. After this treatment an attempt was made to maintain a rectified condition with a commercial rectifier. A large amount of hard sludge was formed, and from all indications the bath was finally rectified. Fig. 5 shows a manifold section treated in this type bath.

Salts W and X: These salts may be considered simultaneously because of their similarity in many respects. They appeared to be composed of barium chloride to which had been added sodium and potassium chlorides. They both fumed rather badly, but presented a clear surface and produced little sludge. Neither salt was rectified during the tests. The same effect was shown here that appeared with pure barium chloride: after operating for a while the salt became hard to remove. This stage took longer to reach in the case of these salts than with pure barium chloride.

Each of them quenched rather quietly and gave a dull brown to black surface on the metal which was easily removed by pickling. Again, pickling was shown to be insufficient for complete salt removal. Parts rusted over night in areas contaminated by the salt. The flux removing properties of the salts were rather poor. Intergranular corrosion was not excessive until after the bath had been operated for a relatively long time without rectification.

Salts Y and Z: These two salts may be considered together, also because of their similarity. They both had the property of being constantly rectified by a blanket of powdered carbon and silicon carbide over the entire surface of the bath. (The carbon serves as a neutral insulator between the barium chloride and air while the silicon chloride reacts with any barium oxide that is formed.) The rectifier was added to the bath as a fine powder which floated on the surface. As the silicon carbide was used up, a hard sludge was formed. Some of this sludge went to the bottom while the

Comparative Behavior of Heat Treating Salts

	$BaCl_2$	Salt W	Salt X	Salt Y	Salt Z	Na_2CO_3
Fuming	D*	D	C	A	A	A
Surface	A	A	A	C	C	A
Sludge	C	C	C	D	D	A
Quench	B	A	A	D	D	A
Color of part after water quench	Brown Green	Black	Brown	Bright	Bright	Black
Stand in air	D	D	D	B	B	A
Flux removal	C	D	C	B	B	A
Intergranular attack	D	B	C	D	A	B
Drag out	A	A	A	C	C	A
Removal of salt by pickling	C	B	B	A	A	A
Rectification	Required	Required	Required	Required	Required	Not required
Operating temperature, deg. F	1900	1750	1750	1800	1800	1700

* Order of preferred behavior indicated as follows: A, B, C, D.

remainder was supported by the film of floating carbon and unreacted silicon carbide. The sludge and the presence of the film on the surface made the use of these salts undesirable.

At operations which take place over 1700 deg. F. or where a neutral salt is required these salts would be highly recommended. One of them is designed for the heat treatment of ordinary alloy steels and the other for the heat treatment of a high chrome alloy. The difference in their behavior toward 18-8 stainless steel was quite noticeable. In 5 min., one of them would produce a layer of heavily corroded material about 0.003 in. deep. Unlike the similar layer produced by pure barium chloride, this one pickled off almost completely. The other salt did not contribute greatly to intergranular attack.

When quenched in water the salts reacted violently. They crackled loudly and spattered hot salt and water over a wide area. This condition may have been caused by the blanket material which stuck to the parts as they were pulled through upon removal from the pot. Also, unlike the other salts in their quenching action, the surface of the metal was bright and practically free of all salt. If the parts were cooled in air it became a simple matter to remove the salt. Both of these salts removed most of the welding flux from the samples, but in no instance was this removal complete.

A Satisfactory Salt

Pure sodium carbonate: This is the one salt which, tested by the laboratory as a heat treating medium for 18-8 stainless steel, emerged as a completely satisfactory product. It is practically an ideal salt because it needs no rectification. Baths which have been operated continuously for a month show no signs of giving trouble. The salt is easily removed from the parts by acid, and the light scale formed by 5 min. immersion can be removed by a cold pickle which has been developed by research. This makes the entire problem of heat treating welded sections very simple. Since all silica base materials are very soluble in sodium carbonate, welding fluxes are easily removed in the bath. This makes it possible to complete the heat treating cycle merely by a 5 min. immersion in the molten sodium carbonate followed by a cold water quench. The parts then may be placed in dilute sulfuric acid to remove the salt, rinsed and placed in the cold pickle for 5 min. After this treatment the parts are free of all salt and flux; they possess a very bright finish (Fig. 6). Test bars, having been strain hardened by stretching to 75 per cent of their total possible elongation, will give an additional 35 per cent elongation by this 5 min. treatment at 1650 deg. F. Fifteen minutes in an air furnace at 1980 deg. F. will produce an additional 40 to 45 per cent elongation on similar test bars.

FIG. 5—An exhaust manifold section which was heat treated in the barium chloride type salt bath, pickled and allowed to stand in air for a few days. The bath was rectified with sodium chloride.

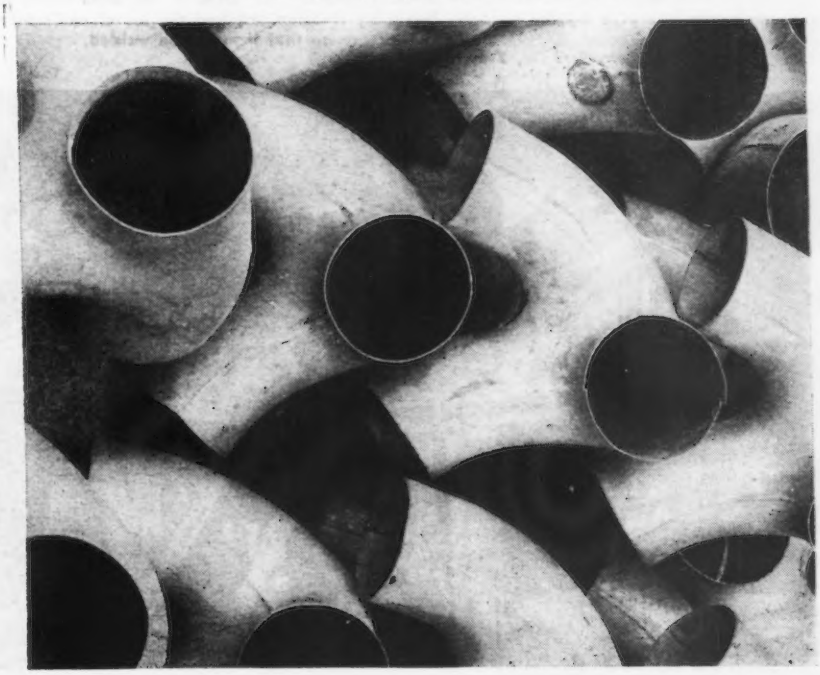
Up to about 1700 deg. F. there is no fuming, but at 1725 deg. F. it is noticeable and at 1750 deg. F. it becomes excessive. Since the bath needs no rectification, it produces little or no sludge other than the contaminants introduced by the parts themselves. It always presents a clean surface and quenches very quietly. Due to its mobility there is very little drag out and the salt that does stick to the parts is easily removed. The cost of the salt itself is far below that of the commercial heat treating salts. All in all, from the standpoint of ease of operation, safety and cost, pure sodium carbonate is by far the best heat treating medium for 18-8 stainless steel that has been tested in the Ryan experimental laboratory.

Recapitulation of Results

The results shown in the table may help to compare the properties of the various salts. Each one is rated A, B, C or D in descending order of desirability. Opinion is based on large scale production conditions where it is necessary to heat treat 18-8 stainless steel parts for short periods.

In view of the fact that all of the commercial salts which were tested were essentially barium chlorides with minor additions, it may be interesting

FIG. 6—A quantity of exhaust manifold parts which have been seam welded, successfully heat treated with the sodium carbonate salt bath and stored until used by the next assembly department. Note luster.



to discuss what actually occurs in a barium chloride bath operating at high temperatures. Although barium chloride has one of the highest decomposition points of the inorganic salts, it does decompose at extreme temperatures. The decomposition apparently is an equilibrium reaction. As fresh salt is heated a liberation of chlorine occurs which gradually ceases, leaving a good deal of chloride in the bath. This indicates that the conversion to oxide is not complete. The effect of this oxide-chloride mixture on stainless steel is very noticeable. The rate of attack is greatly accelerated and the salt becomes very difficult to remove. Parts which have been treated in this mixture rust badly and if left in for a few hours, embrittlement occurs.

In the course of these tests on barium chloride it was discovered that two distinct layers were present in the bath. The top one, about 8 in. deep, was extremely corrosive. It would completely embrittle a piece of 0.031 in. stainless steel in 4 hr. The lower layer had about one-fourth this effect. Due to the complexity of the mixture it was not possible to determine the exact composition of the layers.

Because of the fact that the corrosive action is caused after the salt has partially decomposed to the oxide, it would be logical to assume that if this reaction could be prevented, the salt would behave as normally expected. This assumption is borne out by experiment.

The two methods of preventing the reaction are: (1) to exclude oxygen so that no oxide could be formed, or (2) to add a substance which would remove the oxide as rapidly as it is formed. Normally chloride baths contain the chlorides of sodium, potassium and barium in such proportions that a ternary eutectic is formed. This produces a rather stable, low melting point salt which is quite mobile at operating temperature. These baths are usually rectified at least once every 8 hr. No authority states what happens if the bath is not rectified, but the effect has been quite forcefully shown when 18-8 stainless steel has been treated in an unrectified bath.

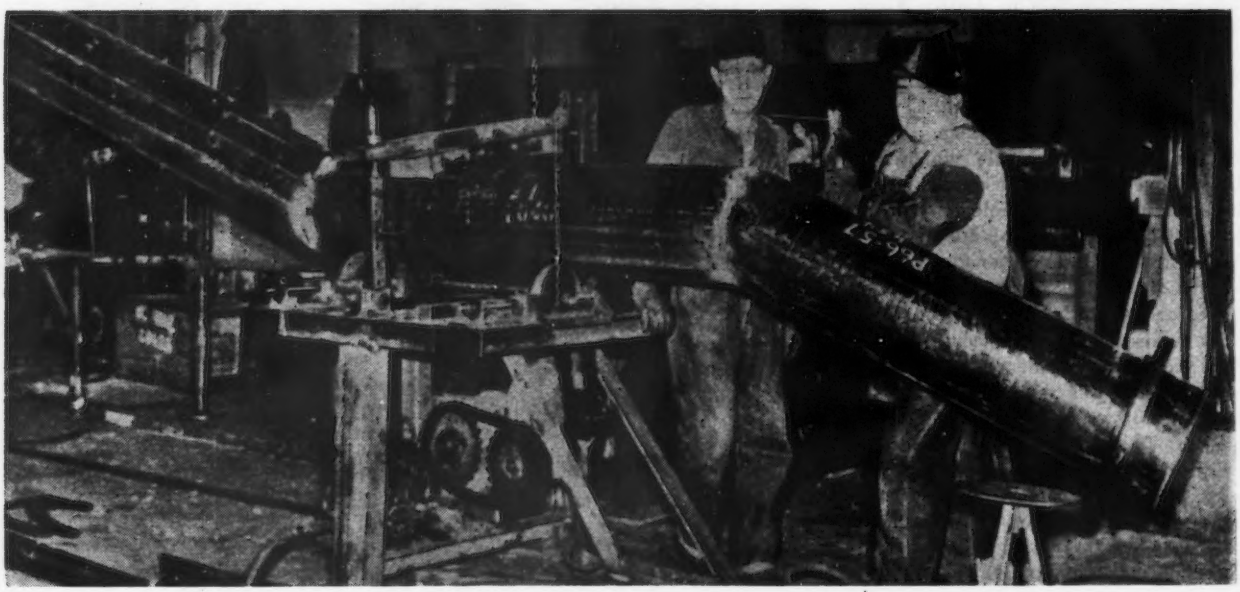
When one of these baths has been in operation for a long period and fails to respond to rectification, it is customary to add sodium chloride to it. This has a very beneficial effect. The barium oxide in the bath combines with the added sodium chloride forming barium chloride and the more volatile sodium oxide which proceeds to distill out of the bath leaving it approximately free of oxides. Because most successful chloride salt mixtures contain sodium and potassium as well as barium, the most volatile oxide, either sodium or potassium will leave the bath as fumes as the chlorine is liberated. This will proceed until all of the sodium or potassium has been boiled out and then the bath will not respond to rectification and will become corrosive.

Hence, the efficient operation of a chloride bath requires that frequent or constant rectification be made. None of the barium chloride salts which were tested fulfill the requirement that the bath shall treat parts in 15 min. or less with a minimum of attention and expense. Also, all of the parts treated in a barium chloride base salt, even in those producing a bright quench, require an acid cleaning operation to remove all traces of salt and scale or they will rust badly on standing in the air a few days. Pure sodium carbonate, on the other hand, will act as a safe treating medium without rectification or any of these other disadvantages.

The development of this ideal salt has reduced the number of steps enumerated in the annealing and flux removing processes from the four previously mentioned to only two. The time required for the procedure has been cut from 59 min. to 15 min. This saving of approximately 75 per cent of the time has permitted the manufacture of exhaust manifold equipment at the Ryan Aeronautical Co. in greater volume. At the same time this increased expansion has been accomplished at a saving in costs of about $100,000 per year in the expenditure required for the performance of the process.

WELDING of large, odd shaped pipes for cargo ships and tankers has been speeded up 33 per cent as a result of a suggestion of Fred Craytor, a welder at Marineship Corp., Sausalito, Calif. A roller stand and positioner rotates the pipe so that the welding is easily and quickly accomplished in the down hand position. This device consists of a welded steel stand which holds the various sizes of pipe securely against drive rollers by pressure rollers. The speed of the drive rollers and the rotation of the pipe are controlled by a foot throttle operated by the welder. Previously it often required the use of chain blocks and small cranes in order to turn the pipe so that it might be welded.

Photo courtesy, Hobart Brothers Co., Troy, Ohio.



Roll Forming of Magnesium Alloys

By JOHN M. THOMPSON, Jr.
Metallurgical Laboratory, Consolidated Vultee Aircraft Corp., Fort Worth, Texas Division

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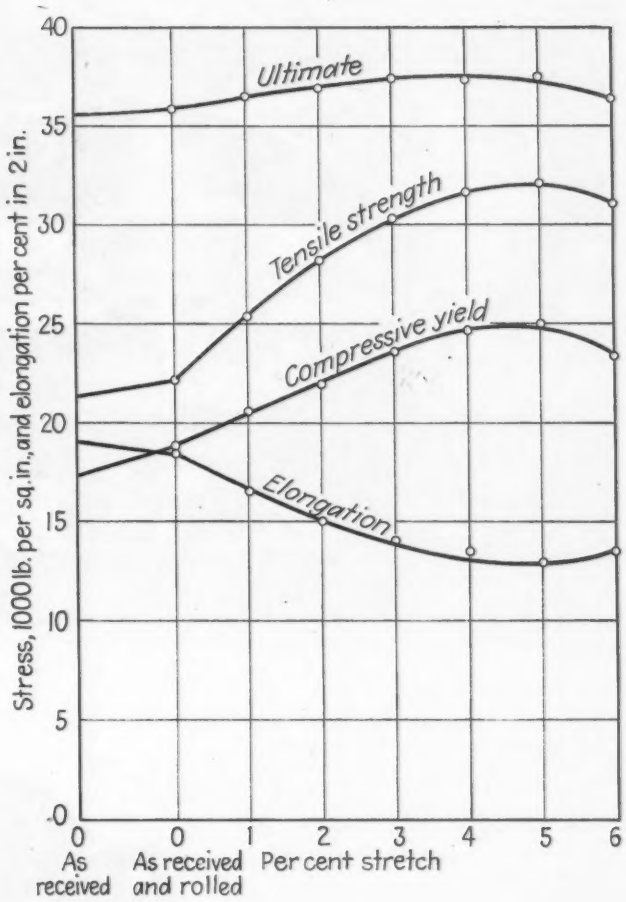
FORMING of magnesium sheet into structural shapes by the Yoder roll forming method is still in the embryonic stage. Since all forming tests were made with production equipment previously used to roll alclad 24S aluminum alloy, it was not practical to hot form the various alloys. Although the initial approach was in that direction, the alternate approach to this problem was to conduct a series of laboratory control tests to determine which of the various commercial magnesium alloys develops optimum design properties and to determine under what conditions these alloys could be cold formed.

The results of these tests indicated that the alloy AM-C52S-O, or its equivalent FS-la, had the optimum combination of compressive yield strength and formability. It was found that the yield strength of this alloy could be increased an appreciable amount by stretching, the increase being proportional to the percentage of stretch imposed upon the material (see Fig. 1). It was also found that AM-C52S-H (FS-1h) could be formed after it was partially annealed. The annealing process naturally causes a loss in the yield strength of the alloy, but the resulting semi-hard material has greater yield strength than in the fully annealed condition. Tests indicated that stretching this partially annealed alloy would restore the mechanical properties lost during the annealing operation.

After these facts were established, the following procedures for roll form-

RIGHT

FIG. 1 — Effect of rolling and stretching on magnesium alloy AM-C52S-O in the form of hat section Y20-12. These curves are typical of the various hat sections investigated.



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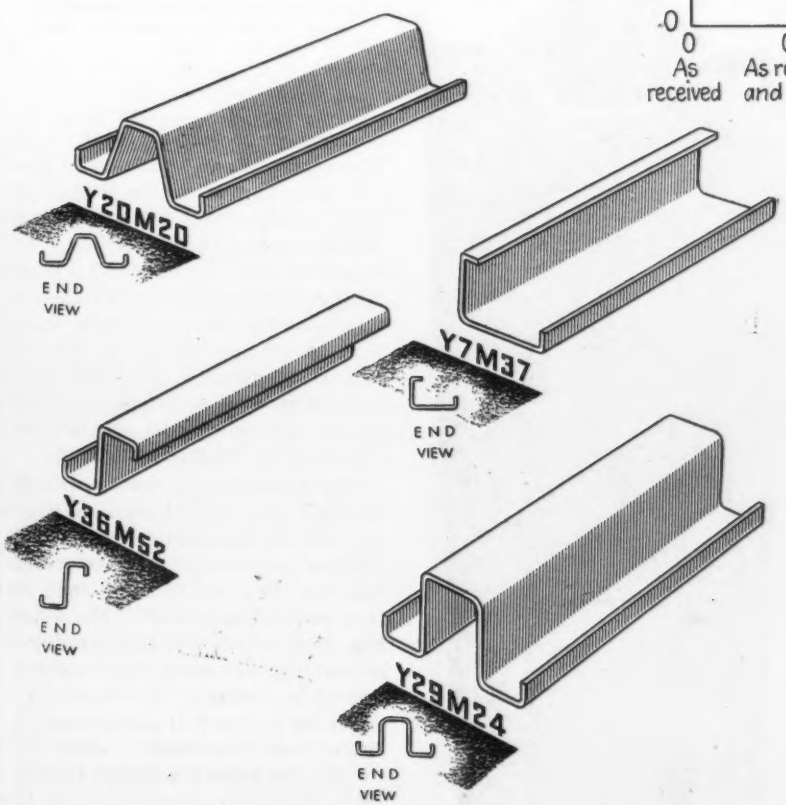
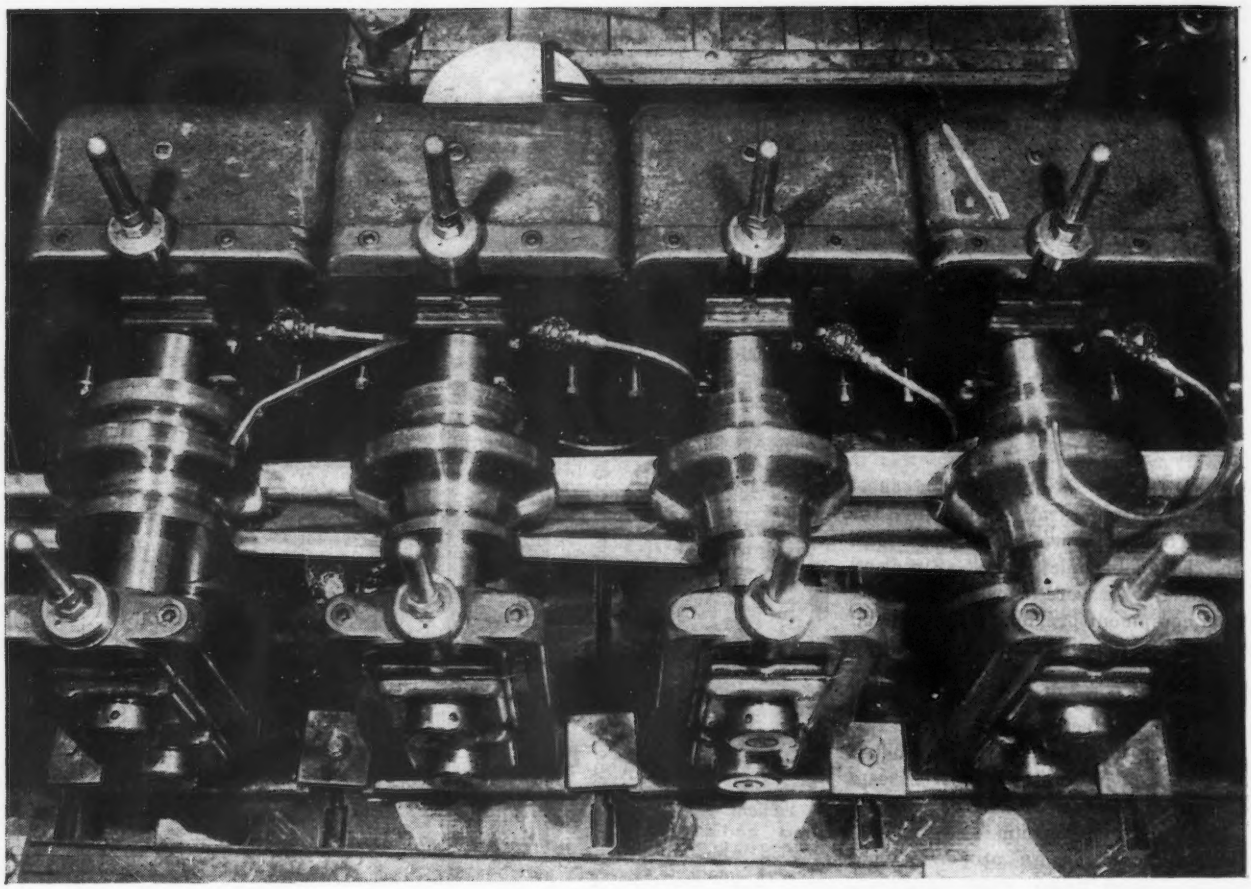
BELOW

FIG. 2 — Typical sections rolled from partially annealed AM-C52S-H (Fs-lh) magnesium alloy.





ABOVE

FIG. 3—This picture shows the progressive reduction of a magnesium strip in a Yoder roll forming machine. The flat strip is entered at the right and becomes a finished hat section at the final stage of operations at the left upon leaving the machine.

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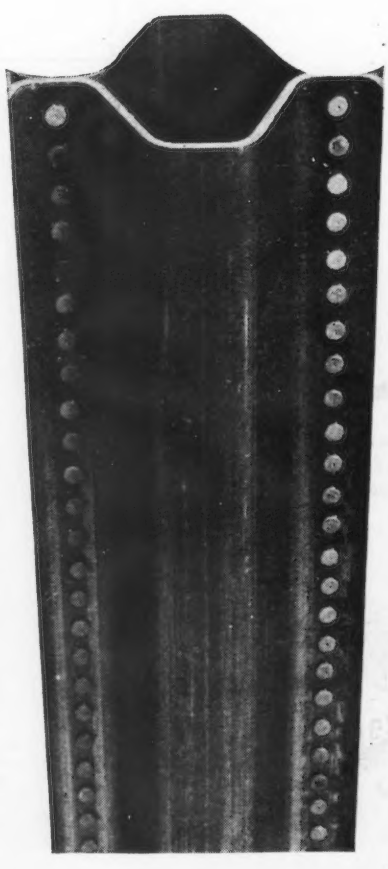
ing were effected. (1) Various types of structures, Fig. 2, were rolled from AM-C52S-O and subsequently stretched to improve the yield strength. (2) These sections were also rolled from partially annealed AM-C52S-H material. This was done by heating the material in production aging furnaces for 20 min. at 355 ± 5 deg. F. The annealing time and temperature was one at which the optimum formability could be utilized without a great decrease in the mechanical properties of the alloy.

As roll forming is a progressive bending process (see Fig. 3) it was possible to roll 90 deg. sections with bend radii as small as 2 or 2½ t without much difficulty. Springback for heavy gage material was rather large, but this condition could be easily overcome by regrinding the Yoder rolls to allow for this springback.

The stretching operation, which was intended to impart additional strength to these sections, was more difficult to perform in production than in the laboratory. It was necessary to polish the outer flanges of the formed sections to eliminate nicks that would initiate tearing in the sections. This expedient did not solve all the difficulties because it was still impossible to stretch this material more than 3 per cent permanent set in the production equipment. This was due to unequal stresses set up in the section by the stretching jaws and the lack of control of the stretching unit.



LEFT

FIG. 4—Shown here is a column formed by riveting together the Y20M20 magnesium hat sections to illustrate the type of column from which column data were obtained as shown in the accompanying chart, Fig. 5.

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Flat ended column tests were made on "back to back" hat sections, Fig. 4, of AM-C52S-O unstretched, AM-C52S-O stretched 3 per cent permanent set and AM-C52S-H that had been partially annealed. These data, Fig. 5, show that AM-C52S-O stretched material has much lower compressive yield strength than material in either the S-O or S-H unstretched condition when L/e exceeds a value of 65 for the end fixity conditions (average value of C-2.5) experienced in this

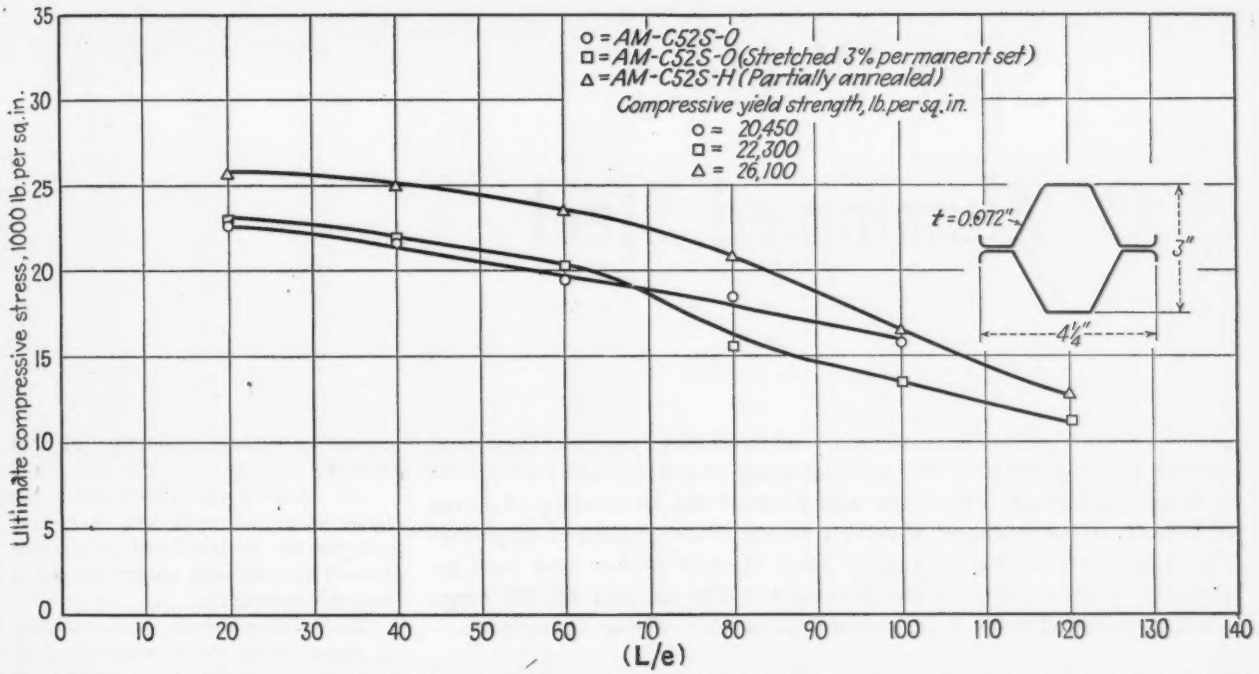


FIG. 5—Column buckling curves for back-to-back hat sections (Y20M20) of AM-C52S magnesium alloys showing the superior strength of the partially annealed material at all column ratios (flat ended columns).

particular test, where L equals the column length and e the least radius of gyration of the section. For this reason, it was decided that stretched sections were of little use, especially as long columns, and all further efforts were directed toward the rolling of partially annealed material. It has been necessary, therefore, to develop the proper cycle for annealing depending on the section to be rolled. Further tests are now being conducted on partially annealing of AM-C52S-H in order to selectively determine the optimum cycle for this operation in the rolling of Y sections. However, using the cycle given above, it has been possible to roll sections in shapes similar to those shown in Fig. 2 and to develop satisfactory properties in such sections.

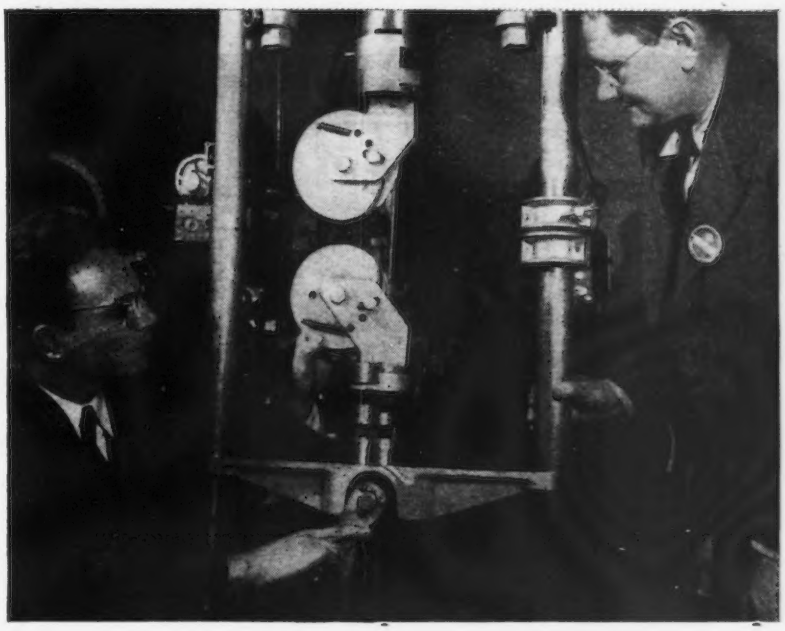
Cable Testing Snubber

A SET of grips for holding cable without crimping it and thereby giving a false breaking point while it is being pulled in a tension testing machine has been invented by James J. Pasela and E. Stanley Knockel, employees in the engineering laboratory of the Glenn L. Martin Co., to whom patent rights have been assigned.

Suggested by the old seafaring trick of looping a rope around a capstan, the new invention (U. S. Patent No. 2,372,962) features a dual pulley whose diameter is such that tension on the cable is relieved and the clamp bears only a small part of the strain. Additional feature is an automatic locking bolt and ingenious scissor mechanism consisting of two cross slots so arranged that the pull of the cable urges the locking bolts into a firm clamping position at the ends of the cable. The self-locking bolt replaces a dozen hand adjusted bolts found in previous types of cable clamps.

A recent demonstration of the new type clamp showed that only 2 or 3 min. were needed to adjust a cable for test purposes, an operation formerly requiring up to ½ hr.

While the patent was pending, the clamp was in constant use at the Martin laboratory and during that time required no repairs. Designed originally for 1/16 to ¼ in. cables, it can be adapted to accommodate any size cable; to fit any type of machine.



Spot Welding Of Aluminized Steel

. . . This report presents in summarized form the results of research carried on to determine the spot welding characteristics of 0.0375 in. aluminized steel. The work was done at the University of Texas as a part of the author's Master's thesis in aeronautical engineering. Shear strengths averaging 1800 lb. and higher can be consistently obtained with a tip pressure of 700 lb. and 18,000 amp., using electrodes of 2 in. dome radius, Mr. Brown concludes.

By HARRY W. BROWN
Design Engineer,
Hughes Aircraft Co., Mar Vista, Cal.

ALUMINIZED steel consists of a steel base coated on both sides with a thin layer of almost pure aluminum. Three types of base metal are available: Low carbon steel, copper bearing steel and high strength steel. All the work reported herein was carried on using the low carbon base material covered by Army Air Forces Specification 11353. The material consists essentially of a core whose chemical composition is equivalent to SAE 1008 steel coated on both sides with an aluminum alloy containing about 8.5 per cent silicon and 0.25 per cent magnesium. Thickness of coat on the 0.0375 in. gage material varies from 0.0013 to 0.0020 in.

Guaranteed properties of this material include the following:

Tensile strength, lb. per sq. in....	45,000 min.
Yield strength, lb. per sq. in.....	30,000 min.
Elongation in 2 in., per cent.....	15 min.
Rockwell hardness	B-70 max.

Primary advantages of this material are its high resistance to atmospheric corrosion and its reasonably good resistance to heat. It will withstand temperatures up to approximately 1000 deg. F. and will also withstand moderate forming and drawing without peeling of the coating.

The welding equipment used consisted of an Acme 75 kva. a. c. type spot welder equipped with thyratron control and with an automatic repeat sequence panel, Fig. 1.

The welding current was measured by means of an electromagnetic oscillograph connected to a manganin shunt in the secondary circuit of the welding machine. Using this equipment, the heat dial on the thyratron control panel was calibrated at 10 per cent intervals from 50 to 100 per cent heat and these calibrated settings used throughout all later investigations.

In so far as possible, the procedure used for determining weld strengths was in accordance with recommendations made by the American Welding Society and published as "Tentative Standards for the Testing of Spot welds in Aluminum Alloys."[1] Accordingly, all weld strengths recorded were determined by taking an average of three tests made under identical conditions. For each setting, an additional specimen was made for metallurgical investigation. Also, after inserting new tips, or cleaning old tips, three or more conditioning welds were made before making a test weld.

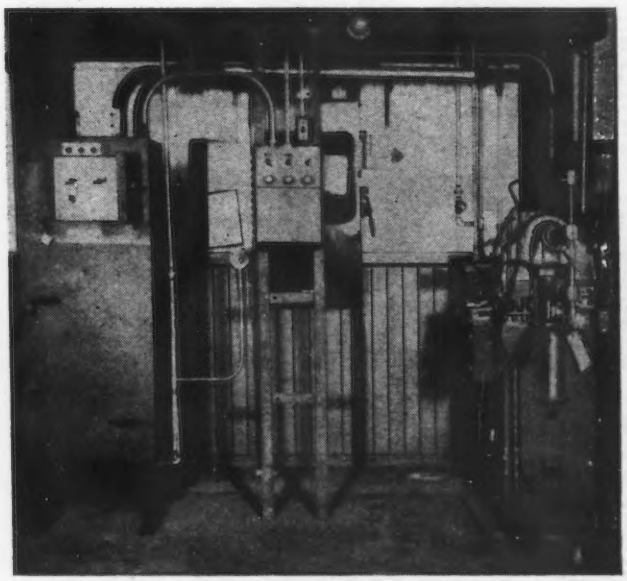


FIG. 1 — Spot welder and control panels used in the tests on aluminized steel.

Effect of Tip Shape

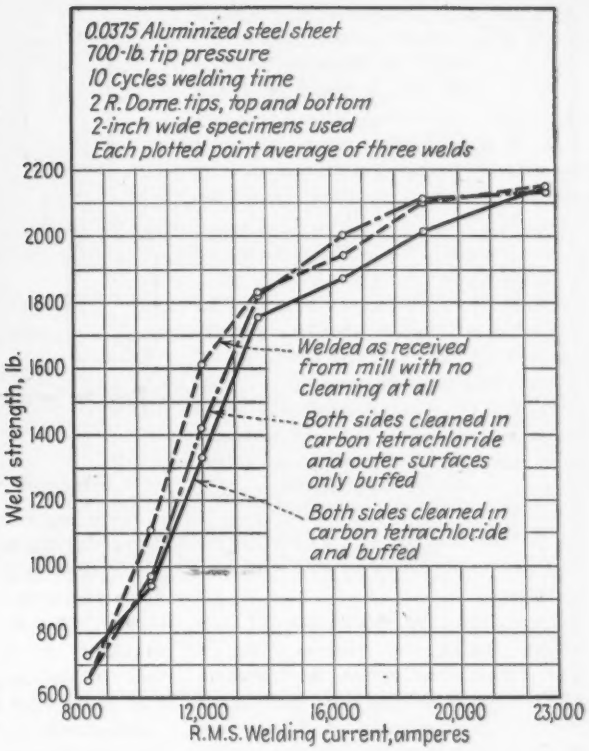
Combinations of tip shapes as given below were investigated:

Top Tip	Bottom Tip
1/8 in. flat, 10 deg. bevel	1/8 in. flat
3/16 in. flat, 10 deg. bevel	1/8 in. flat
1/4 in. flat, 10 deg. bevel	1/8 in. flat
1/4 in. flat, 10 deg. bevel	1/4 in. flat, 10 deg. bevel
2 in. dome radius	1/8 in. flat
3 in. dome radius	2 in. dome radius
4 in. dome radius	4 in. dome radius

Generally speaking, it was found that the flat tips tended to give considerably more expulsion of the aluminum coating than did the dome tips. This detracted both in appearance of the weld and the smoothness of the surface. Also, when using one small flat tip against a larger flat tip, cross sectioning revealed a ten-

ABOVE

FIG. 3—Various sizes of single spot shear specimens tested.



RIGHT

FIG. 2—Effect of surface cleaning on shear strength of welds.

dency of the weld to be half moon shaped rather than the desired oval shape. There also appeared to be an increased tendency for porosity to exist.

Weld strengths using the 4 in. radius dome tips were not as high as those obtained using 2 in. radius tips. Also, strength consistency was much poorer.

The most desirable combination of tips was found to be the 2 in. radius dome tips on both top and bottom. The weld strengths obtained with this combination were as high as those obtained with any other shaped tips. Cross sectioning revealed the weld to have the desirable oval shape with a minimum of porosity. Also, there existed the operational advantage of not having to aline the tips as perfectly as with the flat tips to get satisfactory contact. It is of interest to note that the use of 2 in. radius dome tips has also been found to be highly desirable for aluminum alloys.[1]

Effect of Surface Cleaning

The investigation to determine the effect of surface cleaning involved the running of three series of tests at various amperages. For the first series, the material was welded exactly as received from the mill with no surface preparation whatsoever. In the second series, the material was first cleaned thoroughly in carbon tetrachloride, then was wire brushed on both sides using a 6 in. diameter wheel having 0.003 in. steel wires and driven at a speed of 1800 r.p.m. In the third series, the cleaning procedure was the same as that used in the second with the exception that only the exterior surfaces at the location of the weld were wire brushed.

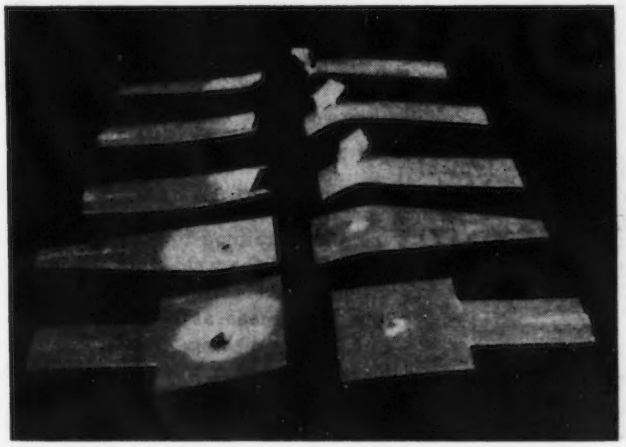
No investigation was carried on using liquid cleaners such as Oakite, etc. It can be assumed however that

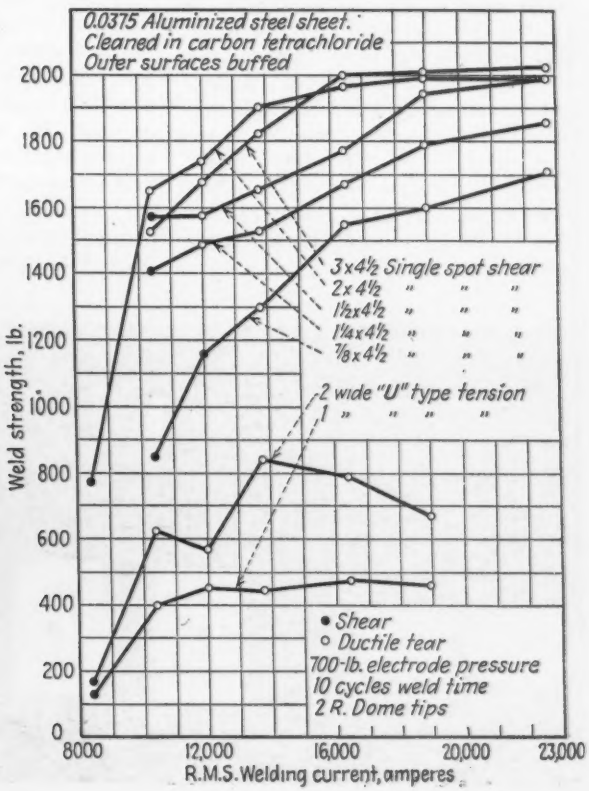
RIGHT

FIG. 4—Effect of specimen size on strength of single spot shear and U type tension test specimens.

BELOW

FIG. 5—Typical fractures of the various sizes of shear specimens tested.





satisfactory chemical cleaning agents would give results comparable to the specimens which were wire brushed on both sides since it has been found that wire brushing, when properly done, will give the lowest and most consistent contact resistance of any method which has yet been developed.[2]

The results of the three series of tests are shown graphically in Fig. 2. From these curves, it can be seen that the weld strengths are not greatly affected by the surface condition of the material. Actually, the highest strengths at a given amperage were found to occur when no surface treatment was given. The reason for this is apparently the increase in heat generated (I^2RT) at the interfaces of the sheets because of the increased contact resistance when no cleaning is done.

Regarding the operation of the welder during the various runs, it was noted that when no cleaning whatsoever was done the expulsion of the aluminum coating on the surface of the metal tended to be somewhat more than when the exterior surfaces were cleaned. Also, tip pickup was somewhat greater and the number of welds which could be made without sticking somewhat less. Buffing of the inner surfaces did not have any noticeable effect on any of the above factors.

The combustion arrived at from the surface cleaning investigation is as follows: The effect of surface condition on spot weld shear strength is not critical. However, to increase tip life, improve weld appearance and nugget shape, the removal of dirt, grease, and oxide film from both surfaces is felt desirable. Failure to remove the oxide film from inner surfaces will make very little difference except possibly to make the cross section of the weld more irregular in shape.

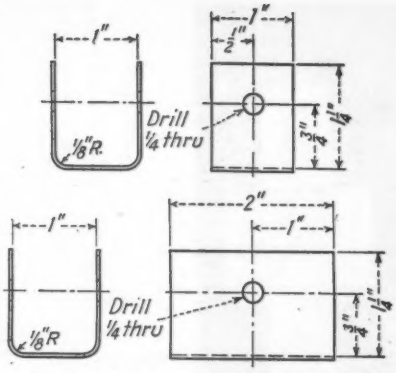


FIG. 6—Two types of tensile test specimens.

Effect of Specimen Width

Investigations were carried out to determine the minimum width of both shear type and U tension type specimens required to give maximum weld strength for a given setting. It was necessary to do this because of the lack of an applicable standard for this particular material.

Standards have been set up covering other materials. For instance, a minimum width of ¾ in. has been found necessary for single spot shear specimens in 24S-T aluminum alloy for metal thicknesses from 0.031 to 0.045 in.[3, 4] A width of 1 in. has been set up for stainless steels from 0.031 to 0.050 in.[4]

On the basis of those standards it was felt that a width of ⅞ in. should be sufficient to insure the maximum strength being obtained from single spot shear specimens in the 0.0375 in. thickness being tested. Accordingly, the first series of tests were run with this width specimens. A second series was then run using specimens 1¼ in. wide. The increase in strength for a given machine setting was so great that subsequent series were run with 1½, 2 and 3 in. wide specimens as pictured in Fig. 3. The results of the tests are shown plotted in Fig. 4, while typical fractures of the various sizes of shear specimens are shown in Fig. 5.

A study of the curves reveals that a minimum specimen width of 2 in. is required to develop the full strength of the weld for the shear type specimens.

The basic reason for the decreased strength of the narrower specimens can be seen by referring to Fig. 5. This figure reveals that failure of the ⅞, 1¼ and 1½ in. specimens occurred by tearing across the weld after severe bending had occurred whereas in the 2 and 3 in. specimens, failure occurred by tearing out of the weld slug only, with very little bending. Since bending puts the weld in partial tension, and since the tensile strength is only about 40 per cent of the shear strength, obviously the strength of the narrower specimens will be lower.

It was desired to obtain a measure of the ductility of the spot welds in this new material for comparison with other materials. A method which has been used for this is the U tension test. Here again, no definite width has been standardized on. Bowman[3] uses a U specimen having a width of 1 in. as Type 1 in Fig. 6. Hess, Wyant and Averbach[5] use on aluminum alloys a 2 in. wide specimen similar to Type 2 of Fig. 6. It was decided to check both of these sizes to see if the variation had any appreciable effect on strength.

The results of these tests are shown at the bottom of Fig. 4. It is evident that a definite increase in tensile strength does result from the use of the wider specimen. Therefore, it is felt that use of the 2 in. wide specimen is preferable to use of the 1 in. specimen. Further investigation to determine the optimum size would be desirable.

Fig. 7 illustrates the reason for the decreased tensile strength of the narrow U specimen. This reason is basically the increased bending that exists with the narrow specimen. Because of this, the stress is not uniform all around the periphery of the weld but instead is concentrated at the two edges, causing a break to occur at a lower ultimate load.

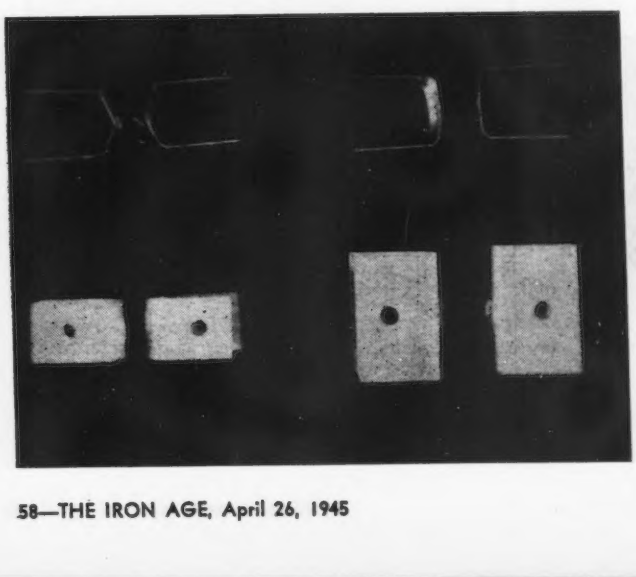


FIG. 7—Typical fractures of the different sizes of U type tension test specimens.

Characteristics of the Welds

Data pertaining to the penetration, diameter of the weld slug, and indentation were obtained by cross sectioning welds made at each current setting, then polishing, etching and photographing them at a magnification of 10X. The etchant used consisted of 2 per cent nitric acid and 10 per

cent picric acid in alcohol. The etching time used was about 12 sec. Macrographs of the six current settings investigated are shown in Figs. 8 through 13. A graphical presentation of the data obtained is given in Fig. 14.

A study of the above mentioned figure reveals the fact that the surface indentation is rather high as compared with either plain steel or aluminum alloy. The indentation of plain steel runs approximately 1 to 2 per cent. The indentation of the aluminized steel tested ran 17 per cent and over.

It is felt that the primary reason for the high surface indentation is the fact that in almost every case, at least some expulsion of the aluminum coating took place, both at the faying surfaces, and from under the electrodes. The expulsion at the faying surfaces appeared to be necessary if high strength welds were to be obtained. Those welds in which expulsion did not take place and only the aluminum coating was fused were very weak and could be broken easily by hand.

The penetration was well within the limits of from 40 to 70 per cent which is considered desirable by most authorities.[1, 6] Calculation of this value was based on the total original sheet thickness as recommended by the American Welding Society.[1]

Regarding ductility, it is felt that welds in this material are at least as ductile as those in aluminum alloy but are not as ductile as those in plain steel. This conclusion is based on the fact that the ratio of tensile to shear strength is greater than that reported for aluminum alloy but is not as high as that reported for steel. The actual ratio, as can be calculated from Fig. 4, varies from about 32 to 44 per cent in the usable range of weld strengths. Hess, Wyant and Averbach[3] found this ratio in Alclad 24S-T aluminum alloy to be 29 to 31 per cent. In mild steel they report a value of from 50 to 75 per cent.[7] Hence, while the ductility does not appear to be as high as with mild steel, it is felt to be entirely satisfactory for the large majority of applications.

The very important characteristic of shear strength per spot turned out to be very favorable as can be seen from the data and figures previously referred to. Strengths as high as 2100 lb. per spot were obtained using the maximum current available from the welder. The author would not recommend using that much current, however, at the 10 cycle setting because of the excessive flash which oc-

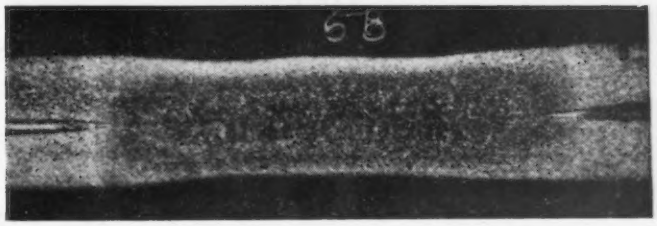


Fig. 8—Photomacrograph of weld made at 10,400 amp. current (10 X).

Fig. 9—Macrograph of weld made at 12,000 amp. current (10 X).

Fig. 10—Weld made at 13,750 amp. current (10 X).

Fig. 11—Weld made at 16,400 amp. current (10 X).

Fig. 12—Weld made at 18,900 amp. current (10 X).

Fig. 13—Weld made at 22,710 amp. current (10 X).

TABLE I

Single-Spot Shear Strengths Recorded By Various Investigators

Thickness, In.	Material	Shear Strength, Lb.	Investigator
0.0375	Aluminized steel	1800–1900	Harry W. Brown
0.040	Alclad 24S-T	725	Hess, Wyant, Averbach[3]
0.040	Alclad 24S-T	613	Della-Vedowa & Rockwell[8]
0.029	Hot rolled, annealed and pickled mild steel	1000	Hess, Ringer[9]
0.036	Cold-rolled low-carbon	1100	Hess, Wyant[6]
0.040	SAE 1020 steel (not tempered in welding machine)	1500–1600	Hess, Herrschaft[10]
0.040	SAE 1020 steel (tempered in welding machine)	1650–1750	Hess, Herrschaft[10]
0.040	NAX 9115 half hard	2500–2600	Hess, Schroder[11]
0.040	SAE X4130 steel (tempered in welding machine)	2600–2700	Hess, Herrschaft[12]
0.038	Aluminized steel (¾ inch wide specimens used)	927–1330	Moon, Matthews[13]

curs. Tip life is considerably less at this setting and the weld appearance poor.

It is felt that the optimum current setting for the 0.0375 in. thickness at 10 cycles time for the conditions stated in Fig. 4 is about 14,000 to 15,000 amp. This gives a strength of about 1800 to 1900 lb. per spot which is near the maximum. Also, the strength curve is comparatively flat in this region so as to give reasonable strength consistency, even though the current may vary slightly. Very little expulsion occurs at this setting.

A comparison of the single spot shear strength of this material with corresponding data obtained by other investigators on various materials is of interest. Such a comparison may be made by referring to Table I.

Regarding weld diameters, Hess and Wyant[6] report a diameter of about 0.20 in. on mild steel whereas the diameter of welds made by the author was about 0.27 in. This larger diameter helps to account for the higher strengths obtained with the aluminized steel.

Effect of Tip Pressure

Preliminary tests were run using tip pressures ranging from 200 to 1000 lb. at the tip. Many of these were cross sectioned and examined under the microscope. It was noticed that at tip pressures below 600 lb., the porosity in the welds was bad. From 600 to 700 lb., pressure on the tips, very little porosity existed. At 700 lb. and above, no porosity at all was noted. Since porous welds are undesirable, the investigation of the effect of tip pressures was therefore limited to pressures of 600 lb. and over.

Three series of tests were run; one at 600 lb. tip pressure, one at 700 lb., and one at 900 lb. The results of the tests are recorded graphically in Fig. 15.

It can be seen from the figure that the tip pressure does affect the strength developed at a given current setting. For example, at 12,600 amp., the strength increased from 1035 lb. at a tip pressure of 900 lb. to 1728 lb. at a tip pressure of 600 lb. It appears that this relationship is more critical at the lower currents than at the higher values.

It is felt that the optimum tip pressure is about 700 lb. for the 0.0375 in. gage material. This value appears to check Rosenblatt's recommended tip force of 625 to 700 lb. for welds made in 0.024 in. aluminized steel.[14]

As to why the tip pressure affects the weld strength in the manner in which it does, it is felt that the increase in contact resistance at the lower tip pressures is directly responsible. This, in turn, increases the heat generated.

Effect of Weld Time

From the basic equation for heat generated in making a spot weld ($H = I^2RTK$), it is apparent that the heat generated is directly proportional to the time T of current flow. This variable then is seen to be of major importance.

That this is so is readily apparent from inspection of the data shown in Fig. 16. It also is quite obvious from this data that if consistent results are to be obtained, the welding equipment used must have accurate means for controlling the time of current flow such as obtained with the electronic controls on the spot welding equipment used.

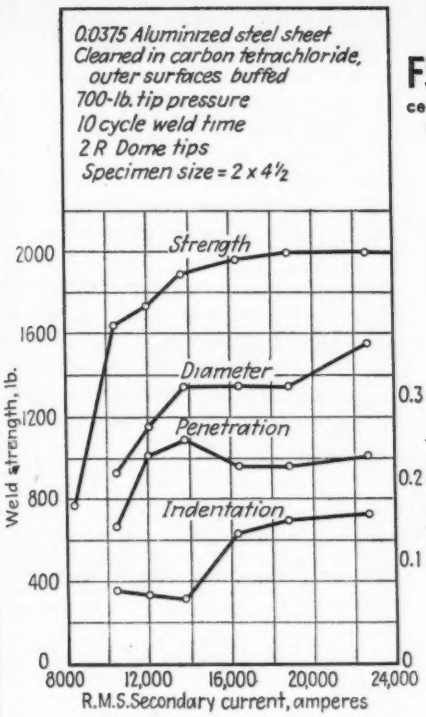
As to why a range of from 2 to 10 cycles was investigated, it is noted that this includes most of the range commonly used for welding both aluminum alloys and steel. Hess and Wyant[6] recommend a time of from 6 to 12 cycles as being best for 0.036 in. automobile-grade mild steel. Hess, Wyant and Averbach[15] report the use of from 6 to 16 cycles on 0.040 in. Alclad 24S-T.

Rosenblatt [14] recommends the use of 2 cycles on aluminized steel, based on the theory that longer duration increases flashing, spitting and tip indentation. At a given current setting, this is undoubtedly the case; however, it was not necessarily found to be the case for a given weld strength.

TABLE II

Dispersion Characteristics of Spot Weld Shear Strengths in 0.0375 in. Aluminized Steel—100 Continuous Welds

Mean strength, lb.	1850
Minimum strength, lb.	1580
Maximum strength, lb.	1965
Maximum negative deviation from mean, per cent	−14.5
Maximum positive deviation from mean, per cent	+ 6.2
Average deviation from mean, lb.	63.2
Average deviation from the mean, per cent	3.4
Standard deviation, lb.	83
Coefficient of variation, per cent	4.3
Welds within 5 per cent of mean, per cent	81
Welds within 10 per cent of mean, per cent	98
Minimum strength as a percentage of A. A. F. minimum allowable on 0.040 in. coated or uncoated steel with ultimate tensile strength below 75,000 lb. per sq. in., per cent	167
Minimum strength as a percentage of A. A. F. minimum allowable on 0.040 in. Alclad 24S-T, per cent	457

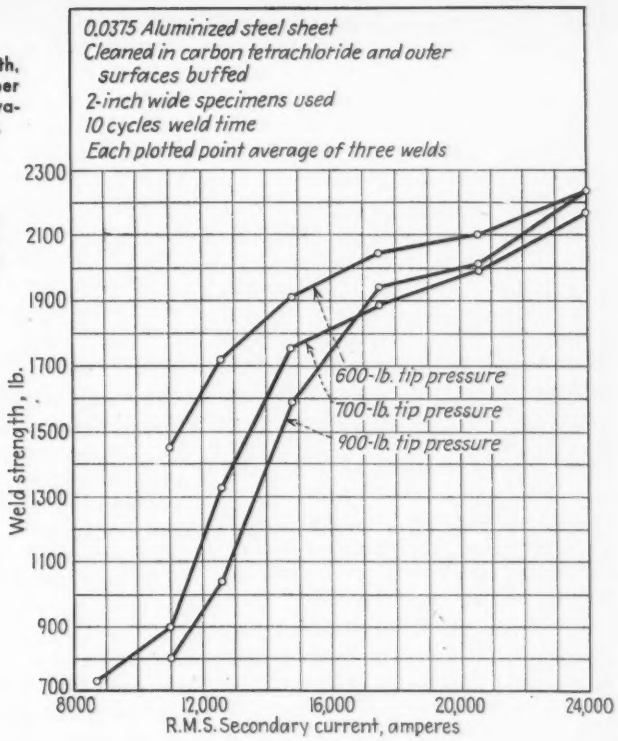


LEFT

FIG. 14—Shear strength, weld diameter and per cent penetration for various current settings.

RIGHT

FIG. 15—Effect of tip pressure on shear strength of spot welds.


0.0375 Aluminized steel sheet
Cleaned in carbon tetrachloride and outer surfaces buffed
2-inch wide specimens used
10 cycles weld time
Each plotted point average of three welds
600-lb. tip pressure
700-lb. tip pressure
900-lb. tip pressure
Weld strength, lb.
R.M.S. Secondary current, amperes

On the contrary, the author noticed an increased tendency for sticking of the tips to occur at the shorter time settings.

Lack of sufficient machine capacity limited the 2 and 3 cycle investigations to strengths considerably below the maximum available. This being the case, the author does not feel that sufficient evidence was obtained to arrive at a final conclusion regarding the desirability of low time settings. The data very definitely prove however that the strength varies greatly with the time of current flow for settings of at least as high as 10 cycles.

Dispersion of Values

The final phase of the research project involved obtaining data relative to the dispersion of spot weld

FIG. 16—Effect of cycles duration of current flow on spot weld shear strength.

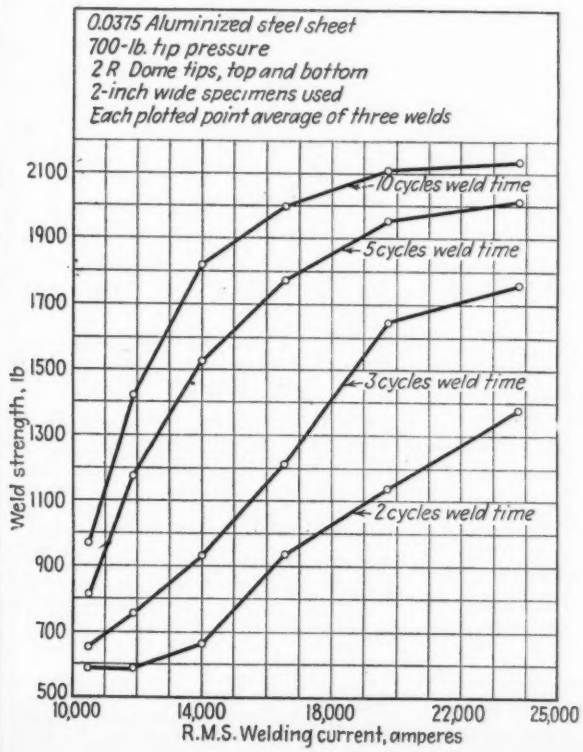
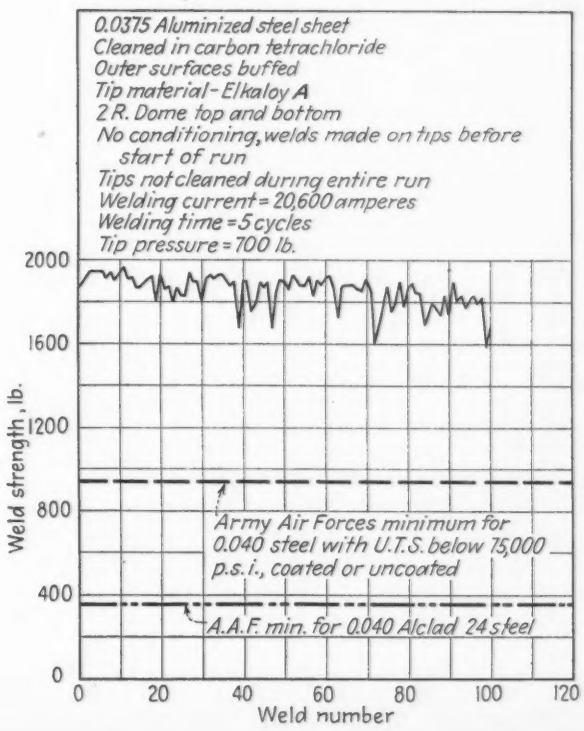

0.0375 Aluminized steel sheet
700-lb. tip pressure
2 R Dome tips, top and bottom
2-inch wide specimens used
Each plotted point average of three welds
10 cycles weld time
5 cycles weld time
3 cycles weld time
2 cycles weld time
Weld strength, lb
R.M.S. Welding current, amperes

FIG. 17—Weld strengths for a series of 100 consecutive welds.


0.0375 Aluminized steel sheet
Cleaned in carbon tetrachloride
Outer surfaces buffed
Tip material - Elkaloy A
2 R. Dome top and bottom
No conditioning, welds made on tips before start of run
Tips not cleaned during entire run
Welding current = 20,600 amperes
Welding time = 5 cycles
Tip pressure = 700 lb.
Army Air Forces minimum for 0.040 steel with U.T.S. below 75,000 p.s.i., coated or uncoated
A.A.F. min. for 0.040 Alclad 24 steel
Weld strength, lb.
Weld number

shear strengths over a long series of welds. The purpose of obtaining this data was to determine the amount of variation in spot weld shear strengths which would result during normal production welding operations between successive tip cleanings.

For making this investigation, a current-time combination was selected which was felt would be as severe as would be suitable for production usage. Accordingly, a current setting of 20,600 amp. at 5 cycles time was selected. Previous investigation show that this setting had given a shear strength of 1955 lb. which is on the high side of the range of recommended usage. Also, to simulate the worst tip conditions, no cleaning whatsoever was done during the entire run. Furthermore, no conditioning welds were made on the tips before the start of the run.

The actual strengths obtained during the run are plotted consecutively in Fig. 17. Various measures of dispersion were calculated from the data obtained. These measures are tabulated in Table II.

The minimum allowable strengths accepted by the Army Air Forces for both 0.040 in. steel with an ultimate tensile strength below 75,000 lb. per sq. in. and 0.040 in. Alclad 24S-T[4] are shown in Fig. 17. The fact that the developed shear strengths greatly exceeded both of these minimums is readily apparent. The actual minimum was 167 per cent above that allowed on steel and 457 per cent above that allowed on Alclad 24S-T. This being the case, there should certainly be no hesitancy in using this material from a strength standpoint.

A comparison of the measures of dispersion tabulated in Table II with corresponding data obtained by other investigators on other materials reveals that from a strength consistency standpoint, welds in aluminized steel are entirely satisfactory. Typical comparisons are as follows: Della-Vedowa and Rockwell[8] found on a 100 spot run on 0.040 in. Alclad 24S-T that the maximum spot strength deviation from the average was +26 and −26.5 per cent, both of which are considerably greater than the +6.2 and −14.5 per cent values obtained by the author. Also, Hess, Wyant and Averbach[2] found on 0.040 in. Alclad 24S-T that only 57 per cent of the welds were within ±5 per cent of the mean and 87 per cent within ±10 per cent of the mean. Corresponding values obtained by the author were 81 and 98 per cent.

It should be kept in mind in analyzing these data that this series of welds were made at a relatively high current setting. As such, deterioration of the tips was undoubtedly accelerated, with resultant increase in dispersion. Also, some sticking of the material to the tips began to occur after the 60th weld had been made. This being the case, cleaning of the tips at that time would probably have been desirable and would have tended to decrease the dispersion as well as to increase the mean strength.

Tip Life

The only specific data obtained on this matter was as mentioned in the previous paragraph wherein it was noted that 60 welds were made before sticking occurred. The high current used undoubtedly tended to decrease the number of welds made before sticking occurred. Thus, it is felt that between 75 and 100 welds probably could be made at a slightly lower current. This compares favorably with the electrode performance data on a.c. equipment given in Table A-1 of the "Tentative Standards and Recommended Practices and Procedures for Spot Welding of Aluminum Alloys."[1] This table lists from 15 to 125 as being the average number of welds between tip cleanings for different companies, the average value being 46 welds.

There is a tip pickup of aluminum after the making of only a very few welds. Rosenblatt[14] mentions this characteristic as well as noting that it may actually increase the strength. The feelings of the author are in agreement with this up to the point at which sticking begins to occur.

Inasmuch as it has been noted that some expulsion of the aluminum coating takes place, both on the outer surfaces and on the faying surfaces during the making of a weld in aluminized steel, the question will no doubt arise as to whether or not corrosion is apt to take place at the points where the aluminum coating is expelled. The author did not run any salt spray tests on any of the spot welded panels to check this matter. Such tests, however, have been carried on by the Boeing Aircraft Co. Moon and Matthews[13] reporting on these tests state: "Inspection test showed that after 144 hr. under the salt spray, slight corrosion products appeared but did not increase in number or area by the end of 250 hr." They found the effect of the existing corrosion to be negligible as far as the strength of the weld was concerned. Their conclusion was that the expulsion of the coating at the location of the weld did not accelerate the tendency for corrosion to occur a sufficient amount to be harmful.

It is felt that the reason that little if any corrosion difficulties occur is the fact that the aluminum coating is anodic to the steel core and therefore tends to deposit itself on any bare steel which is near by when an electrolyte such as moisture in the air is present.[16] Thus, any steel exposed to the atmosphere during the making of a weld soon thereafter acquires a thin film of aluminum over it due to the galvanic action with the adjacent aluminum coating. This film retards or prevents further corrosion from taking place.

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Beryllium Copper

A Review of Its Properties

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. . . To the extensive amount of general data which has been published in recent years is added this contribution from British sources, presenting much specific data on mechanical and physical properties of an alloy which has considerable post war application possibilities.

AMONG the new alloys finding increasing application under present war conditions—and they are certain to be more and more widely used in peace—are beryllium copper alloys. L. David, of the Beryllium Smelting Co., Ltd., London, has carried out a number of interesting researches relating to these alloys, and the writer is indebted to him for permission to record something of his work.

In the production of electrical equipment, there has always been a demand for a metal with high electrical conductivity and high tensile and fatigue strength. For such purposes, steel springs have been used, but while they possessed high tensile and elastic strength, actually they were unsuitable because of their low electrical conductivity and their practical lack of resistance to corrosion. Phosphor bronze and nickel copper alloys also have been used, but even in these alloys the electrical conductivity was not always satisfactory.

Beryllium copper alloys answer all these requirements, being corrosion resistant, non-rusting, non-magnetic, having excellent electrical conductivity and high tensile strength up to 211,000 lb. per sq. in. (1). Of outstanding importance also is the unusual corrosion-fatigue resistance which has been reported higher by 50 million cycles than the fatigue resistance of a specimen in dry air. It has also been found that heat-treated beryllium copper has a lower degree of creep or elastic hysteresis than other commercially used alloys. This factor has been responsible for successful application in the instrument spring field, thermostatic diaphragms and other control units.

Hysteresis of less than 0.1 per cent and no measurable elastic lag at fiber stress of 10,000 lb. per sq. in. has been reported.

Because of the exceptional resistance to wear, these alloys are used for bearings, worm gears, heavy duty valve sleeves and elsewhere where high strength is required and lubrication conditions are poor, such as in valve guides of high powered aircraft engines where the corrosive effect of high-lead gasoline is also present (2).

Apart from these characteristics beryllium copper alloys are non-sparking and therefore in use for non-sparking safety tools. At present beryllium copper alloys are used in a very wide field, particularly in radio and other electrical engineering applications.

Springs made of this alloy can withstand many million flexations because of their unusual high resistance to fatigue. Beryllium copper helical springs combine relatively low torsional modulus with high elastic limit and withstand high stress under static load without taking a permanent set.

Fatigue (endurance) limits range from over 35,000 to 44,000 lb. per sq. in. and therefore compare favorably with heat-treated low carbon steels. A unique feature however of beryllium copper alloys is their ability to maintain this property under conditions of high corrosion. Gough and Sopwith (3) found that an endurance limit of 38,000 lb. per sq. in. under salt spray is higher than that of any other known material, including heat-treated alloy steels and stainless steel.

The above mentioned characteristics insure an almost unlimited field for the use of beryllium alloys apart from the purposes already mentioned. These alloys are used, for instance, in paper-making and textile machinery, surgical blades, oil burner jets, valve electrodes, dental instruments, contact brushes, parachute brackets, bolts and screws, and springs in chemical plants.

Nickel Added

The beryllium copper alloys can be divided into two categories, the original binary alloy containing up to 3 per cent beryllium, and the more recently developed ternary alloys where either nickel or cobalt is added. The

TABLE I

Approximate Properties of Beryllium Copper Sheet
(2.00-2.50 per cent Be) (0.025 in. thick sheet)

	Johnson's Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation, Per Cent in 2 In.	Young's Modulus, Lb. per Sq. In.	Conductivity, Per Cent I.A.C.S.
Soft-annealed state	24,000	70,400	53.0	18,000,000	17.2
Soft, then heat treated at 575 deg. F. 1½ hr. in salt bath	108,000	161,200	8.50	18,800,000	22.0
Soft, then rolled ½ H hard	60,000	92,800	18.0	17,500,000	17.3
Soft, rolled ½ H then heat-treated at 550 deg. F. 1 hr. in salt bath	120,000	182,300	4.50	18,600,000	23.0
Soft, rolled ½ H then heat-treated at 700 deg. F. 1 hr. in salt bath	82,000	140,000	9.0	19,000,000	34.5

For other data on beryllium copper, the reader is referred to the following articles which have appeared in THE IRON AGE: "Heat Treating of Beryllium Copper," by Wayne Martin, Feb. 24, 1944, p. 66; "Predicting Spring Performance of Beryllium Copper Wire and Strip," by H. G. Williams, July 8, 1943; and "Beryllium—A Versatile Element," by Louis L. Stott. See also ASTM B120-41T Tentative Specifications for Beryllium Copper Alloy Rods, Bars, Sheet, Strip and Wire.

characteristics of the most usual binary alloy containing 2.5 per cent are found in Tables I, II and V.

The additional nickel tends to make the beryllium copper easier to handle in the mill and the tension test properties are better than those of the binary alloy. The presence of nickel in the alloy retards the precipitation of the hardening component so that the rate of cooling from the high temperatures during the initial stage of the hardening treatment does not need to be so high. This is of course of particular advantage in hardening large cross-sections for which the ratio of surface to mass is low, with corresponding difficulty in extracting the heat quickly even with water quenching, particularly in cases of castings.

It is important to note that it is possible to use air quenching, while moderate sized sections can be quenched in oil, as has been found preferable in hardening steel. For instance, in the hardened state a beryllium copper alloy containing 2.39 per cent beryllium was found to have a maximum Brinell hardness of 375, while an alloy with substantially the same beryllium content (2.38 per cent) and 1.98 per cent nickel, had a Brinell hardness of 387. The binary alloy attained maximum hardness by reheating for 2 hr. at 300 deg. C., but when heated to the same temperature for 20 hr., the Brinell hardness dropped to 290, and a further heating after 6 hr. at 330 deg. C. caused the Brinell hardness to drop further to 269. On the other hand the ternary alloy withstood the same treatment without any reduction of its hardness, and the same alloy when subjected to a temperature of 330 deg. C. for 26 hr. after reaching its maximum Brinell hardness of 387 suffered only slight reduction in hardness to 381. A rolled sheet of ternary alloy containing 2.3 per cent beryllium and 1.1 per cent of nickel showed a maximum tensile strength of 211,000 lb. per sq. in. and 2 per cent elongation (3).

TABLE II

Physical Properties of Beryllium Copper Containing 2.00-250 per cent Be

Density	0.297 ± 0.001 lb./cu. in.
Maximum increase in density on heat treatment	0.6 per cent
Maximum increase in length on heat treatment	0.2 per cent
Specific gravity	8.22 ± 0.2
Melting range deg. F.	Liquidus 1751 Solidus 1587
Coefficient of Expansion:	
(20 — 100 deg. C.)	16.5 — 16.7 × 10^{-6}
(20 — 200 deg. C.)	16.8 — 17.1 × 10^{-6}
(20 — 300 deg. C.)	17.5 — 18.0 × 10^{-6}
Crystal structure—alpha phase	Face centered cubic
Lattice constant—alpha phase	3.56 ÅU
Crystal structure—gama phase	Body centered cubic
Lattice constant—gamma phase	2.70 ÅU
Electrical conductivity at 20 deg. C.:	
Soft or hard drawn	17.5 per cent + I.A.C.S.
Heat-treated to maximum hardness	20-22.5 per cent I.A.C.S.
Heat-treated to maximum conductivity	32-38 per cent I.A.C.S.
Electrolytic potential	Negative to hydrogen positive to copper
Torsional modulus	7.1 — 7.3 × 10^{-6}

Thermal Conductivity	B.t.u. per Sq. Ft./In. per Sec./Deg. F. at 68 Deg. F.	Cal. per $Cm.^3$/Cm. per Sec./Deg. C. at 20 Deg. C.
Soft annealed	0.16	0.20
Soft annealed then heat treated	0.20	0.25
Hard drawn	0.14	0.18
Hard drawn then heat treated	0.16	0.20

The particulars of properties of the ternary alloys as shown in Tables III and IV will assist comparison. Both binary and ternary alloys are used for practically identical purposes.

Non-Sparking Tools

Beryllium alloys are of particular importance in the manufacture of non-sparking safety tools because these alloys combine non-sparking qualities, stability at normal temperatures with exceptional hardness. Tools such as chisels, hammers, drills, pliers, screw-drivers, shovels, wrenches, etc., are already in extensive use in munition factories, the oil refining and numerous other industries where sparks would cause disaster. Usually such tools are made from either binary or ternary alloys and particularly an alloy containing 2.25 per cent beryllium and 1.1 to 1.3 per cent nickel are reported in use for the manufacture of tools. Such safety tools show a tensile strength of 90,000-130,000 lb. per sq. in., Brinell hardness 300-400 and an elongation between 0 and 10 per cent (4).

Although for all practical purposes beryllium copper tools are non-sparking, it should be mentioned that under certain conditions sparking might result. It has been reported that if beryllium copper tools are struck against hot steam pipes or ferrous metals in a rusty condition, sparks may be caused by the heat formation of the oxide of the material being used; that is to say when these tools are used and small particles of metal are chipped off, the exposed surfaces of these metals oxidize with such rapidity that they sometimes become incandescent.

The heat of formation of oxide of steel particles is approximately 590 cal. per gm., while that of copper is only 314 cal. per gm. It will thus be seen that with the liberation of approximately twice the heat in the oxidization of steel over copper, sparks are more likely to occur. Such sparks have been reported by large chemical plants and United States government works to be so short lived and feeble, however, as to be

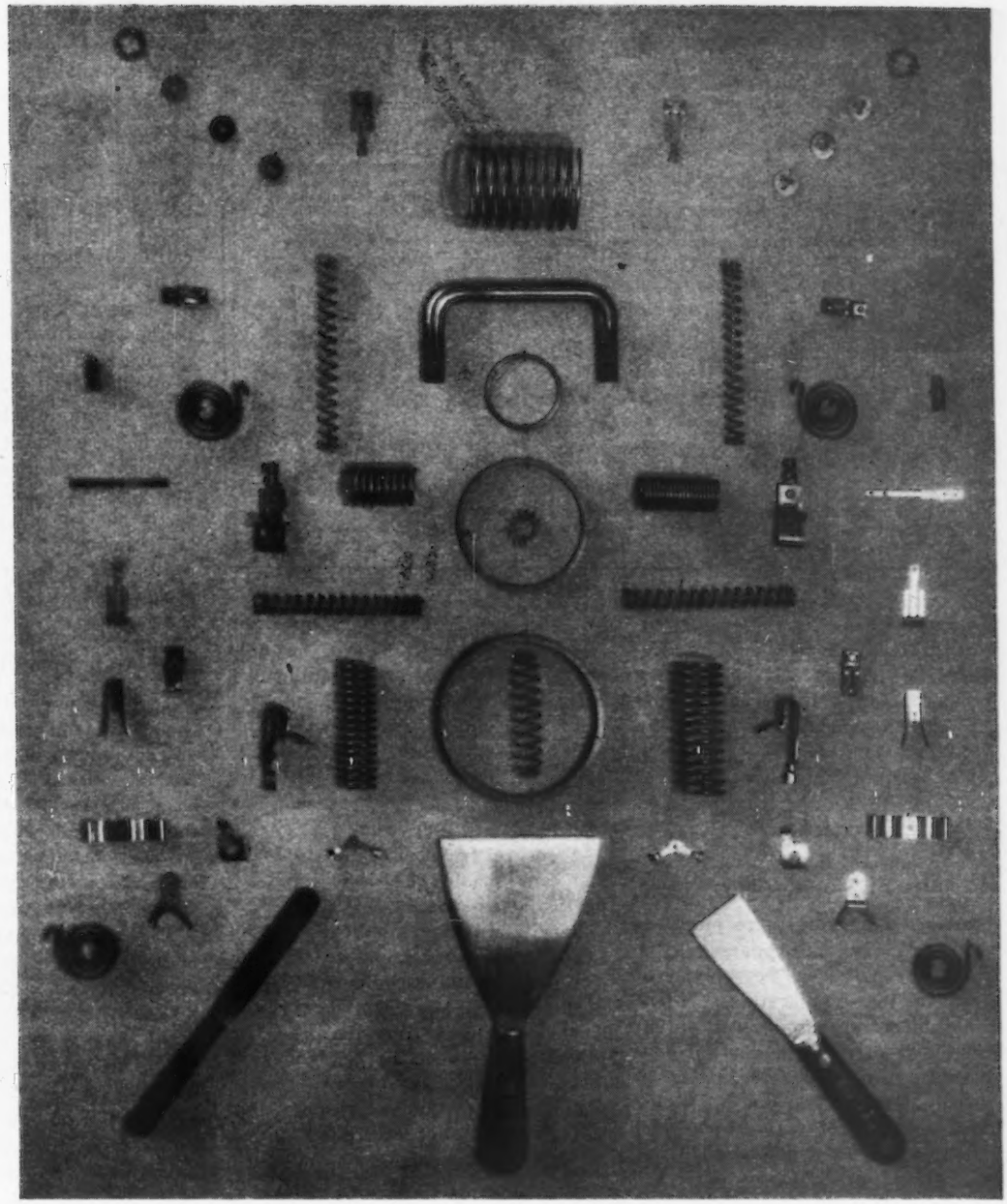
TABLE III

Physical Properties of Brush Beryllium Co. Conduloy

Heat Treated Test Bars Cast in Green Sand

Be Per Cent	Ni Per Cent	Quench Temp. Deg. C.	Time Hr.	Aging Temp. Deg. C.	Time Hr.	Proportional Limit Lb./Sq. In.	Ultimate Tensile Lb./Sq. In.	Reduction Area Per Cent	Elongation in 2 In. Per Cent	Electrical Conductivity Per Cent	Brinell Hardness
0.233	1.48	As cast	0	As cast	0	16,800	51,300	31.2	16.2	42.2	110
0.278	1.39	As cast	0	As cast	0	20,830	53,900	14.0	15.0	36.7	110
0.233	1.48	900	2	No age	0	5,750	36,650	53.0	35.0	38.5	55
0.233	1.48	900	2	450	2	46,450	82,450	1.2	5.7	50.0	201
0.278	1.39	850	2	400	2	29,500	67,500	30.8	16.5	42.1	171
0.278	1.39	1000	2	400	2	62,130	84,600	7.2	3.8	42.4	189
0.278	1.39	850	2	500	2	47,670	72,600	12.0	5.0	55.5	171
0.278	1.39	900	2	500	2	60,000	85,000	4.1	2.5	52.8	179
0.278	1.39	1000	2	500	2	59,000	84,300	3.8	1.1	52.6	201
0.321	1.47	900	2	600	2	27,400	64,900	20.6	10.0	57.6	141
0.321	1.47	900	2	550	2	47,000	73,000	9.3	6.2	57.7	181
0.232	1.42	900	2	450	2	50,000	72,500	12.9	2.5	55.4	209

These alloys may be readily sand cast by any of the approved foundry methods. They flow freely and follow intricate patterns accurately. Forging and heat-treating improves all their physical properties appreciably.



BERYLLIUM copper is particularly adapted to applications requiring high electrical conductivity in spring parts, high strength and particularly resistance to fatigue under corrosive conditions.

Photo courtesy Riverside Metal Co.

capable of being practically disregarded.

Heat Treatment

Beryllium copper is usually supplied in a semi-hard or slightly cold worked form suitable for the requirements of the fabricator and is finally heat-hardened in the form of manufactured parts. All these alloys can be hot forged or hot pressed within temperatures ranging between 1050 and 1425 deg. F. and should be maintained close to the upper limit but not over. For hot forging, the homogeneous treatment should be applied in order to render the metal suitable for precipitation hardening; the temperature for this treatment should be about 1425 deg. F. followed by an immediate quench in cold water. The final heat hardening treatment on hot forged material is recommended at about 575 deg. F. for 1½ hr. or more, according to size, in a salt bath.

Of greatest importance is the application of two basic heat treatments: The one used for softening or annealing is accomplished by quenching immediately in cold water from 1350 to 1475 deg. F.; the other, which is a finer hardening treatment, is effected at temperatures between 500 and 700 deg., cooling in either water or air. All suppliers of beryllium copper provide exact instructions as to the most suitable heat treatment. Although beryllium copper is not a free cutting alloy, no particular difficulties will be encountered in machining if it is handled the same as in work hardened bronze. However, sharper tools are recommended for cutting in the hard state and good soluble oils should be used.

It should be mentioned that beryllium copper alloys can be softened after heat treatment without difficulty and can also be plated by the usual plating methods with the usual plating metals. The heat treatment will usually cause formation of a slight scale which is easily removed by simple cleaning operations. Such scale is usually binary; the outer dark portion is soluble in a solution of two parts of commercial sulphuric acid and one part of water and the time of immersion in the solution is not of much consequence. The reddish colored scale beneath is soluble in a solution made up of one part of commercial sulphuric acid to seven parts

TABLE IV

Results From Testing the Brush Beryllium Co. Alloy Test Bars Cast in Green Sand

Be Per Cent	Ni Per Cent	Prop. Limit Lb./Sq. In.	Ultimate Strength Lb./Sq. In.	Elong. in 2 In. Per Cent	Red. in Area Per Cent	Brinell Hardness	Electrical Conductivity in Per Cent of Copper	Heat treatment* after four hours annealing at 810-826 deg. C. and quenchirg in water
2.44	1.19	85,000	193,500	0	2.6	387	22.7	16.5 hr. at 319-337 deg. C.
2.44	1.19	68,300	156,000	7	9.7	321	27.6	16.5 hr. at 378-385 deg. C.
2.44	1.19	68,300	75,800	34.5	33.3	135	15.4	None
2.47	1.28	127,500	188,500	2.0	5.6	396	.....	22 hr. at 325 deg. C.†
2.47	1.28	75,000	132,000	12.5	20.0	269	.....	3 hr. at 450 deg. C.
2.56	1.26	125,500	181,500	1.5	5.2	402	.....	22 hr. at 325 deg. C.†
2.56	1.26	90,000	135,000	11.0	20.0	286	.....	3 hr. at 450 deg. C.

* After 4 hr. annealing at 810-826 deg. C. and quenching in water.

† The heat treatments at approximately 325 deg. C. were for convenience carried out overnight. In practice 4 hrs. at 350 deg. C. gives the same result.

of water, with 1-3 oz. of sodium dichromate to a gallon of solution. The time factor in this solution is very important as this pickle has a corrosive effect on the alloy. When parts are in this solution they should be kept in constant motion until the red film is dissolved, and then washed thoroughly in water.

Use of Master Alloys

Most beryllium alloys are produced by adding beryllium copper master alloy in the desired proportion to copper in the liquid state. Where ternary alloys are produced it is desirable to have available also the copper nickel alloy containing 10 to 40 per cent of nickel and due allowance should be made for 5 to 10 per cent loss of beryllium by oxidation during the alloying ([8]).

The beryllium copper master alloys usually contain up to 5 per cent beryllium and are practically all produced by an arc reduction process where the beryllium oxide is reduced by means of carbon in the presence of metallic copper or copper oxide. A small percentage of silicon (0.08 to 0.10 per cent) and iron up to 0.09 per cent as well as aluminum up to 0.2 per cent is usually present ([8], [10]).

In one of these reduction processes, the dross originating from smelting the master alloy is used again. For instance, a beryllium copper alloy with 4 to 5 per cent beryllium may be smelted in a crucible with copper and nickel to produce the final alloy usually containing 2 to 2½ per cent beryllium. During this melting process there is always a loss of beryllium and of the other metals due to oxidization and the oxidized metals appear as dross on the surface. This dross which is skimmed off can be used again after mixing and grinding in a ball mill. The composition of this dross is usually as follows: copper 86 per cent, metallic beryllium 1.28 per cent, beryllium oxide 7.40 per cent, silicon oxide 0.35 per cent and iron 0.15/0.25 per cent.

A recovery of beryllium up to 64 per cent should be possible in this particular process ([10]).

Beryllium copper alloys in all forms have been produced in commercial quantities for almost 10 years in the United States, where beryllium is also extracted from the ore. The production of such in England is a relatively new development. Safety tools from beryllium alloys have only recently been manufactured in England as well as sheet wire rods and tubes ([6], [7]).

No metallic beryllium is produced in Great Britain but ample supplies of beryl are found within the British Empire, particularly in India, South Africa and Canada. Also beryl produced in South America could be shipped to England at practically the same cost as to the United States where at present both Indian and South American beryl is used.

Green Sand Castings

For casting beryllium copper a sand suitable for bronze castings of the same dimensions may be used. For very fine castings a sand with a clay content of 15 to 20 per cent is desirable, for medium or heavy castings one of from 10 to 15 per cent. The type of sand should be governed by the surface desired. A surface of fine grade of "Red Lock" (type of sand) has been found suitable. The moisture in the sand should not be more than enough to insure good molding qualities.

The mold may be sprayed with molasses water and treated with plumbago or dusted with straight plumbago. Care should be taken that an excess of water is not absorbed by the mold. The surface of the mold may be cautiously dried either by a gas flame or by the use of charcoal and the mold must be left open until just before pouring to eliminate the possibility of sweating. For small castings surface drying generally is not needed.

In designing the mold, a choke should be provided so that the metal may be slowed up and enter the casting very smoothly and quietly. Directly back of the choke there should be a sufficiently large skim riser to collect any scum or dross held by the choke and prevent it from entering the mold cavity. The pouring sprue should be kept full during the pouring.

To overcome the jetting effects of the choke, the gate should be flared out so that it is wider where it enters the casting proper. The skim riser may be located further back on the runner and closer to the pouring sprue, thus allowing the lengthening out and the curving of the choke, still further slowing up the metal.

The metal should be well covered in the crucible with clean graphite or ground carbon; glass may also be used.

In pouring the alloy, great care should be taken not to overheat the metal in its liquid state as overheating causes rapid oxidization, resulting in excessive loss of beryllium. Ordinarily the pouring range is from 1850 to 1950 deg. F. However, in pouring unusually thin sections a pouring temperature of 2050 deg. F.; may be used. For most castings the ideal temperature is 1950 deg. F.

After the metal is poured, it is a good practice to feed the castings through risers using a graphite rod. Heavy sections should be amply provided with risers so that the metal will feed and not crack at thin sections due to shrinkage. Beryllium copper should be sprued about the same as aluminum or manganese bronze. The shrinkage of beryllium copper is 3/16 in. per ft.

When several melts are made, 50 per cent virgin ingot and risers may be used.

The procedure of alloying beryllium copper master alloy with copper and nickel is first to melt the copper and when molten, add the required amount

of 20 per cent nickel copper (50 per cent nickel-copper may be used). After the nickel-copper is completely dissolved, add the beryllium copper master alloy. After the beryllium copper master alloy is melted, stir the alloy thoroughly, using a graphite rod or stirring ladle.

In compounding such an alloy as beryllium aluminum, using beryllium metal, the procedure is as follows:

Melt half the desired amount of aluminum; when molten add enough flux made of equal parts of calcium fluoride and barium fluoride to cover the melt thoroughly. To this add the required amount of beryllium metal and when the beryllium is dissolved, add the balance of the aluminum. An induction furnace is preferable for melting.

References:

[1] Riverside Metal Co.
[2] Canadian Department of Mines and Resources.
[3] British patent No. 532133, Brush Beryllium Co.
[4] Ampco Metal, Inc., Milwaukee.
[5] British patent 523810, Beryllium Corp.
[6] Telegraph Construction & Maintenance Co., Ltd.
[7] Mallory Metallurgical Products, Ltd.
[8] Brush Beryllium Co.
[9] H. H. Gough & Sopwith J. Inst. Metals, 60, pp. 143-53, 1937.
[10] British patent No. 500469, Beryllium Brush Co.

TABLE V

Tensile Strength and Rockwell Hardness of Beryllium Copper Sheet and Strip Heat Treated to Maximum Hardness

(All Rockwell hardness values indicated are minimum)

Alloy	Beryllium	2.000-2.25
	Metals (impurities) other than above maximum	0.50
	Copper	remainder
Rockwell Hardness	Rockwell values indicative of tensile strength are shown for convenience. All Rockwell values are subject to confirmation by tensile strength tests and are based on readings taken on one thickness of metal.	

SUPERFICIAL ROCKWELL HARDNESS TESTER
15N (15 kg. load diamond penetrator)
Hardened from

Temper	Soft	¼ Hard	½ Hard	¾ and Harder
Minimum Tensile Strength	160,000 Lb./Sq. In.	165,000 Lb./Sq. In.	170,000 Lb./Sq. In.	175,000 Lb./Sq. In.
Thickness In.				
0.005	74	74.5	75	75.5
0.006	75	75.5	76	76.5
0.008	76	76.5	77	77.5
0.010	77	77.5	78	78.5
0.018	78	78.5	79	79.5
0.022	79	79.5	80	80.5
0.032 and over	80	80.2	80.5	80.7

SUPERFICIAL ROCKWELL HARDNESS TESTER
30N (30 kg. load diamond penetrator)
Hardened from

Temper	Soft	¼ Hard	½ Hard	¾ and Harder
Minimum Tensile Strength	160,000 Lb./Sq. In.	165,000 Lb./Sq. In.	170,000 Lb./Sq. In.	175 000 Lb./Sq. In.
Thickness In.				
0.012	53.5	54	54.5	55
0.016	54.5	55	55.5	56
0.020	55.5	56	56.5	57
0.025	56.5	57	57.5	58
0.032 and over	57.5	58	58.5	59

STANDARD ROCKWELL HARDNESS TESTER
B-scale (100 kg. load 1/16 in. ball penetrator)
Hardened from

Temper	Soft	¼ Hard	½ Hard	¾ and Harder
Minimum Tensile Strength	160,000 Lb./Sq. In.	165,000 Lb./Sq. In.	170,000 Lb./Sq. In.	175,000 Lb./Sq. In.
Thickness In.				
0.012	105.5	106	106.5	107
0.018	106.5	107	107.5	108
0.025	107.5	108	108.5	109
0.032 and over	108.5	109	109.5	110

STANDARD SCALE ROCKWELL HARDNESS TESTER
C-scale (150 kg. load diamond penetrator)
Hardened from

Temper	Soft	¼ Hard	½ Hard	¾ and Harder
Minimum Tensile Strength	160,000 Lb./Sq. In.	165,000 Lb./Sq. In.	170,000 Lb./Sq. In.	175,000 Lb./Sq. In.
Thickness In.				
0.050 and over	34	35	36	37

STANDARD ROCKWELL HARDNESS TESTER
G-scale (150 kg. load 1/16 in. ball penetrator)
Hardened from

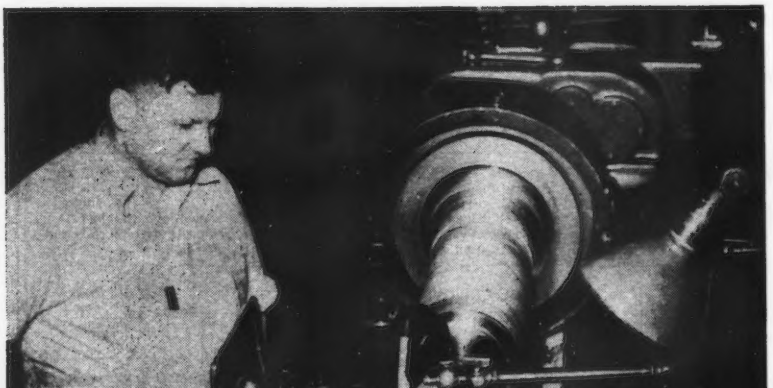
Temper	Soft	¼ Hard	½ Hard	¾ and Harder
Minimum Tensile Strength	160,000 Lb./Sq. In.	165,000 Lb./Sq. In.	170,000 Lb./Sq. In.	175,000 Lb./Sq. In.
Thickness In.				
0.018	94	94.5	95	95.5
0.022	95	95.5	96	96.5
0.032 and over	96	96.5	97	97.5

Pulverized Silver Alloy Brazes Small Wires

A NEW method of brazing small round wires with diameters of 0.0226 to 0.049 in. has been adopted in the distribution transformer division at General Electric's Pittsfield works. A mixture consisting of equal amounts of filed silver solder and borax flux is used.

The end of one of the two wires to be brazed is either moistened or heated and then inserted in the container holding the mixture. When a sufficient amount adheres to the wire, the two ends are placed together and heated over a gas flame until the silver alloy is fused. If correct heating is applied, the joint will be free of lumps and points, eliminating a finishing operation before the braze can be insulated.

Formerly a strip silver alloy and flux was used in brazing these small wires. This resulted in a loss of the silver both from drip at the braze and from an excess of brazing material at the point of contact. The new method has resulted in a saving of approximately 80 per cent of the strip silver alloy.



Choice Of Carbide Grades

. . . As part of a program of developing standards for machining various metals with cemented carbide tools the standards department of the Crane Co., Chicago, has taken the initial step of selecting what their experience teaches them is the most suitable grade of carbide for each application.

ESTABLISHMENT of standards for carbide tipped tools for general machining at the Corwith Chicago plant of Crane Co. presented a problem in correlation of the various carbide manufacturers' grade recommendations. Wide variation in information obtainable lacked definite value to form a fixed basis for proper tool tip selection to suit general shop practice.

A number of makes and grades of carbide were available in tool crib stocks. Moreover, previous existing shop practice allowed each machining section to select the grade of carbide tip in the standard tools it would employ; thus it was quite common for tools utilized on identical or comparable operations to have different grades of carbide tips. An operator who by chance encountered exceptional performance from a certain type of carbide tool on a specific job would from then on want that same grade tip no matter what job or material he encountered. Allowing each section to develop its own practice in selection of carbide tip tools prevented the establishment of definite machining standards.

The vast range of Crane products produced at the Corwith plant involves the use of over 67 different alloys, ranging from the soft bronzes to Stellite, and machining operations from plain boring to hyper milling.

The eventual goal of the standards department was to develop machining practice standards on operations utilizing carbide tipped tools. These standards would serve as a control for proper utilization of labor and equipment, and assure the safeguard of machinery, maintenance of operating schedules, and form a sound basis for deriving labor costs and establishing uniform incentive or piecework rates. Equipment involved varied widely as to type, age, make, and horsepower available.

Before proper analysis of machining operations could be initiated to lead to comprehensive operation standards, it obviously was necessary to place tools on a common plane through establishment of a definite tool tip selection chart. The approval and establishment of a standard tool tip chart would provide a common denominator from which complete time study observations on the many operations, alloys and types of alloys could be related.

Accordingly various technical data,

TABLE I

Recommended Grades of Carbide Tools for Cutting Various Materials
(See Table II for Key)

Material Machined	Plain Turning	Interrupted Turning	Plain Facing	Interrupted Facing	Plain Boring	Interrupted Boring	Standard Milling	Hyper Milling	Reaming
Aluminum bar stock	4	4	4	4	4	4	4	4	4
Aluminum castings	4	4	4	4	4	4	4	4	4
Aluminum forgings	4	4	4	4	4	4	4	4	4
Brass bar stock	4	5	4	5	4	5	4	4	4
Brass castings	4	5	4	5	4	5	4	4	4
Brass forgings	4	5	4	5	4	5	4	4	4
Cast or malleable iron	5	7	5	9	5	9	5	5	5
Exelloy bar stock	8	8	8	8	8	8	8	8	8
Exelloy castings	5	5	5	5	5	5	5	5	5
Exelloy forgings	8	7	8	7	8	7	8	8	8
Monel bar stock	8	7	8	7	8	7	8	8	8
Monel castings	8	7	8	7	8	7	8	8	8
Monel forgings	8	7	8	7	8	7	8	8	8
Common steel bar stock	8	7	8	7	8	7	8	8	8
Common steel castings	7	7	7	7	7	7	8	8	8
Common steel forgings	8	7	8	7	8	7	8	8	8
Hard steel bar stock	9	7	9	7	9	7	8	8	8
Hard steel castings	8	7	8	7	8	7	8	8	8
Hard steel forgings	9	7	9	7	9	7	8	8	8
Stellite	4	5	4	5	4	5	4		4

together with the use recommendations by the manufacturers of carbide tipped tools were studied and compared with actual results encountered in general shop practice. Variations were wide. Some carbide manufacturers, probably bearing in mind the possibility of extreme operating conditions, proved to be unusually conservative in their recommendations. The reverse was also true, inasmuch as some tool performance claims were unusually optimistic. Some tools for which claims of extraordinary performance under severe operating conditions had been made by the manufacturer failed to meet these claims during shop tests.

Therefore, extensive standards tests were devised and placed in shop practice under the direct observation of the Crane Co. time study men, working in cooperation with the tool and pattern department. All data thus obtained throughout the plant was analyzed, indexed and classified to form the basis of the standards chart.

Operations included plain turning, interrupted turning, plain facing, interrupted facing, plain boring, interrupted boring, standard milling, hypermilling and reaming in accordance with Crane Co. general shop practice. Tests for each operation were applied to broad types of material normally machined. These were classified as follows: Aluminum bar stock, aluminum castings, aluminum forgings, brass bar stock, brass castings, brass forgings, cast and malleable iron, Exelloy (an 11-13 per cent chrome steel) bar stock, Exelloy castings, Exelloy forgings, Monel bar stock, Monel castings, Monel forgings, common steel bar stock, common steel castings, common steel forgings, hard steel bar stock, hard steel castings, hard steel forgings, and Stellite, an extremely hard cast material.

Results of these tests combined with past shop experience to provide a sound basis of recommendation for tool tip choice as applied to common operations, normal operating conditions, and equipment as found in the Crane plant. Findings were such that equivalent tools of competing manufacturers could be recommended based on Crane experience, regardless of other claims or experience.

Recommended carbide tipped tools for each operation were correlated with standard tool crib stocks. For many operations equivalent grades of two or three manufacturers were indicated as being available. (See Table II.) Recommendations of particular brands were made, however, based on stock availability. Because such relative availability is not pertinent to other shops, this section of the recommendation has been eliminated from accompanying charts.

Recognizing that variation in individual machines, material factors, or other unusual circumstances might alter the normal choice, notation was made providing for modified tool selection in accordance with good practice. In a production shop such as Crane, such deviation is the rare exception rather than the rule, however, and the selection chart was adopted as standard.

TABLE II

Key to Table I Listing Comparative Grades of Carbides

Grade Key No.	Trade Designations		
	Manufacturer A	Manufacturer B	Manufacturer C
1	HC	55A	2A3
2	HB		
3	H		2A6
4	HD	905	2A5
5	HA	883	2A7
6	HF	999	2A9
7	T-04	78C	XX
8	T-89	78A	X
9	TA	78B	EE
10	T-16	907	
11	T-31	831A	E

Crankshafts Polished to Less Than 2 Microinch

EVOLUTION of a new method of polishing aircraft engine crankshaft pins and bearings at Cadillac Motor Car Division has reduced surface finish roughness by more than 100 per cent besides effecting a saving of machines and space.

Previous to the installation of this new method, crankshafts had been lapped on a machine equipped with a 320-grit abrasive cloth to size the journals, eliminating taper and out-of-round conditions. The shaft was then moved to another lapping machine equipped with 400-grit waterproof back paper and the journals given a final polish. With difficulty surfaces were held to tolerances in surface finish of between 4 and 5 microinch.

A general foreman of the Allison crankshaft department suggested that both lapping operations be performed without moving the crankshaft to another machine. Now, when the first polishing operation is completed, strips of the 400-grit polishing paper are laid over the crankshaft journals and under the 320-grit belts. They are adjusted so that a previously used section of the finer belt always is in contact with the shaft. The double thickness of belt, with the 400-grit paper against the shaft journals, then performs the final polishing operation.

The final polishing results in a profilometer reading of from 1½ to 1¾ microinch—one of the finest surfaces ever produced in industrial practice.

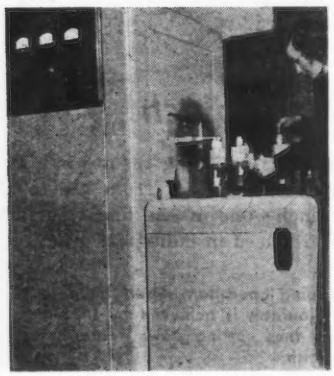
ON the same machine in which the initial lapping operation is performed the final polishing of Allison engine crankshaft journals is achieved by slipping strips of 400-grit belts under the coarser belts, thus cutting down setup time and improving the finish.

New Equipment . . .

Heat Treating

. . . Recent developments in induction heating equipment, industrial furnaces and process control instruments are described in the following pages.

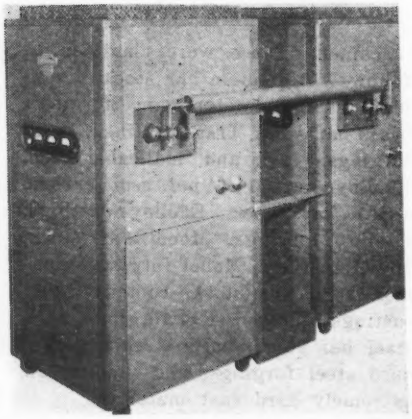
AN electronic induction heater for brazing, soldering, annealing, hardening and pre-forge heating applications has been announced by *Allis-Chalmers Mfg. Co.*, Milwaukee. With a low-loss coupling arrangement, the electronic generator can be adapted to metal working applications without the use of radio-frequency transformers. Predetermined automatic timing controls each unit operation. Other features include a current limiting circuit for protecting the oscillator filament and prolonging tube life, a



three-phase rectifier on larger size units to obtain maximum power and prevent unbalance of the power line, and safety devices for full protection of the operator and the unit. All models have a capacity of 10 or more kw. and operate from either 220 or 440 volt, three phase supply.

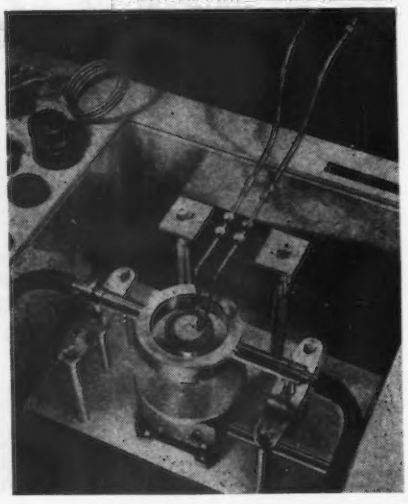
Tandem Induction Heaters

A COAXIAL equalizer which permits harnessing of its Model 1070 induction generators to double power output has been announced by *Induction Heating Corp.*, 389 Lafayette Street, New York 3. Since each of the Model 1070 generators has an output of 1070 B.t.u.'s per min., full 40 kw. of power is available with a single control station. For installation, only the connection of the equalizer to the output terminals of the generators is required. An additional interconnection is made between the power sections of the generators to give electrical stability. The equipment can be operated single, two or three phase.



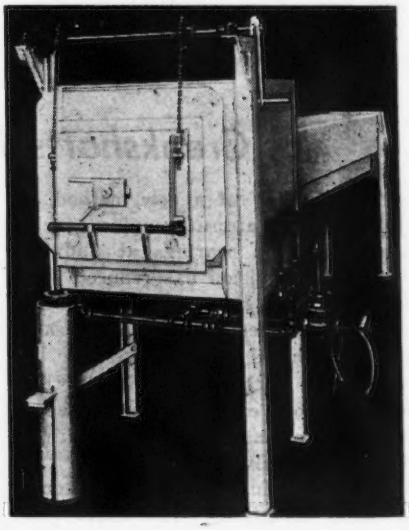
Induction Heating Fixture

A ROTO-HEATING and quenching unit for gears and pinions has been announced by *Lepel High Frequency Laboratories*, 39 West 60 Street, New York 23. The device causes the part to revolve at a predetermined speed within the load coil during the automatically controlled heating and quenching cycles. It can be operated in connection with any standard Lepel induction heating unit.



Protective Atmosphere Furnaces

DESIGNED for temperatures between 120 and 2400 deg. F. on such heating operations as bright annealing, silver or copper brazing, tool



hardening, high speed steel hardening, scale-free hardening, non-decarburizing heating or sintering powdered metals, Kleenmetal oven-type protective atmosphere furnaces have been announced by *W. S. Rockwell Co.*, 50 Church Street, New York 7. The furnaces are of two types, those with Carborundum or alloy muffles and those which are heated directly. Muffle furnaces are gas or oil fired; direct heated furnaces, gas or electric. For hardening and certain other heating operations the long preheating chamber has a chute leading to a quench tank set in front of the furnace. A water-jacketed cooling chamber for

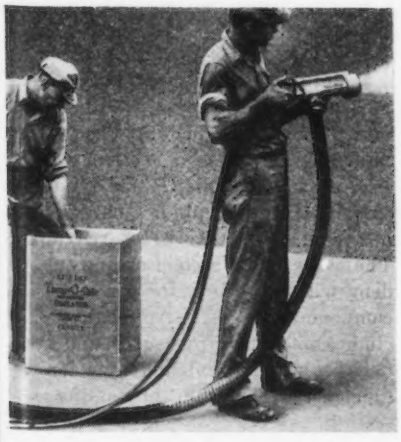
cooling the work in the protective atmosphere is also provided. Furnaces are built with hearth areas of 8 x 12, 12 x 16 and 16 x 24 in.

Induction Heating Work Table

A SINGLE position, general purpose induction heating work table which is claimed to provide optimum flexibility in regard to range of applications when used with standard Thermonic generators has been announced by *Induction Heating Corp.*, 389 Lafayette Street, New York 3. The tablet bench includes a sink for use in spray quenching operations. The control circuit contains two timers, one for controlling the quenching period and the other for controlling the delay period from the end of the heating cycle to the start of the quench cycle. Accessory equipment also includes a rotating spindle mounted below the work coil and quench ring to provide for rotation of the work during the operating cycle.

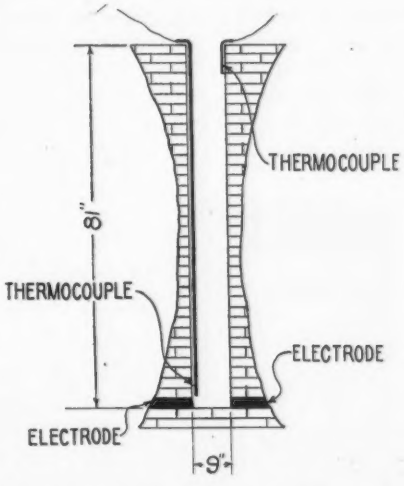
Insulation Spray Gun

A GUN designed to speed up the sealing and insulating of open hearth walls and bulkheads has been announced by *Illinois Clay Products Co.*, 608 South Dearborn Street, Chicago 5. The gun siphons dry Therm-O-Flake insulation direct from the shipping carton, mixes it with water and sprays it to the refractory wall in one operation. Premixing is eliminated and the applications are said to be 6 to 8 times faster than by manual methods. The gun operates on standard air and water pressures, weighs 4 lb., and has 15 ft. sections of air, water and vacuum hose.



Vertical Salt Bath

AN internally heated electric salt bath furnace specially designed for heat treating in a vertical position long broaches and similar work



which are likely to distort when treated horizontally has been announced by *Upton Electric Furnace Division*, 7450 Melville at Green, Detroit 7. The depth of the furnace is 81 in. while the surface is only 9 in. square. It is claimed that such proportions have never been successfully combined before in an internally heated electric salt bath furnace due largely to the limitations of the conventional type of electrodes. Upton electrodes center through the sides of the furnace and at the bottom of the pot in contrast with other types which require approximately 25 per cent of the working area. Consequently with no space required in the working area of the pot itself, the pot need be only of sufficiently large surface area to admit the work.

Heat Resisting Paint

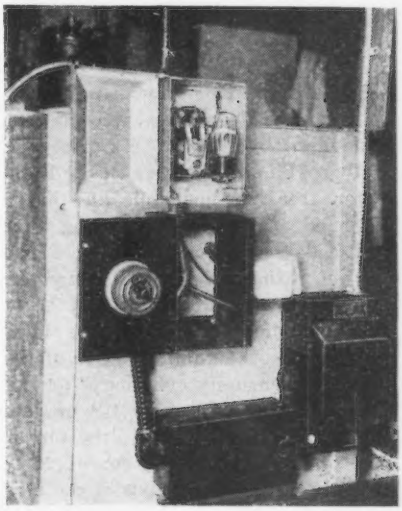
A PAINT that neither blisters nor cracks under temperatures ranging up to 1400 deg. F. has been announced by *M. J. Merkin Paint Co.*, 1441 Broadway, New York City. Suggested uses to which the product can be applied include high pressure steam lines, smoke stacks, heat treating equipment, kilns, dyeing and carbonizing equipment, etc. The product is manufactured in neutral gray.

Casting Sealant

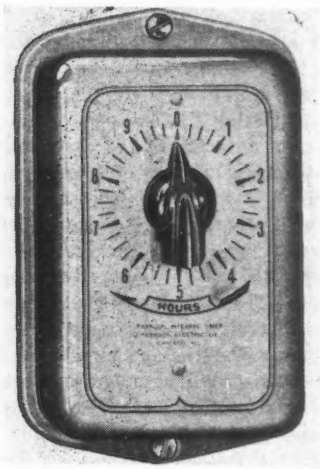
THE development of a series of Thalid compounds to be used in the sealing of non-ferrous aircraft engine castings has been announced by *Monsanto Chemical Co.*, St. Louis, Mo. Thalid X100 series resins used as casting sealants are thermosetting solutions, a mixture of base resin and styrene monomer. By varying the ratio of the two, the viscosity of the impregnating solution can be controlled to meet varying requirements arising from variation in the size of microporosity in aluminum and magnesium. The sealant is said to have excellent stability under high engine temperatures and good resistance to lubricating oil, hydraulic fluids and cooling solutions.

Pyrometer

IMPROVEMENTS in the Radiamatic which will make the compensated radiation pyrometer secure against air and gases up to 1 lb. per sq. in. gage pressure at temperatures up to 250 deg. F. have been announced by *Brown Instrument Co.*, Philadelphia. They include the use of an adhesive sealing compound between the lens and mounting rings, use of brass for lens retaining and mountig rings and controlled torque applied when assembling the lens retaining and mounting rings. The two spaner wrench holes in the lens mounting ring face are replaced with a milled slot which avoids cutting through the



ring face. More positive sealing of the sighting glass is obtained with an improved adhesive. The Radiamatic consists mainly of a heat resisting lens, a compensator and a thermopile which generates an e.m.f. proportional to the object's temperature. The measurements are independent of ambient temperature.



Interval Timer

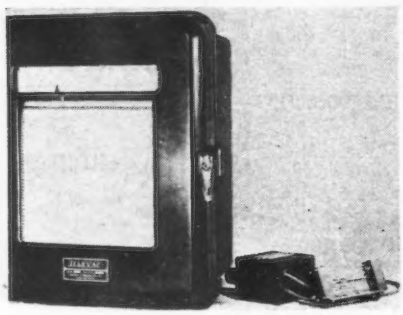
A MANUALLY preset interval timer, Model 2500, has been developed by *Paragon Electric Co.*, 37 West Van Buren Street, Chicago. It can be preset to allow a given operation to continue for almost any predetermined time limit and to close or open a circuit at the end of the preset time. Switches are fully enclosed and are of 1000-watt capacity. There are only two exposed gears. The motor is self-starting and is completely sealed. There are ten time ranges from 0 to 15 sec. through 0 to 20 hr. The unit can be mounted on the surface of any panel or directly to the surface of the equipment the timer is to control.

Flow Rate Indicator

A ROTASIGHT flow rate indicator and flow rate alarm has been announced by *Fischer & Porter Co.*, Hatboro, Pa. It operates on the Rotameter area-type principle and has a V-ported transparent metering tube with a float which rises in direct proportion to the flow through the meter. The float in the Rotasight may be of any convenient shape because it is stabilized by the guiding action of the tube. It is usually cylindrical and of such length that it can't tilt or jam but is so designed that at the top of the Rotasight it affords excess flow capacity. It will not restrict the flow in the case of a line surge past its rated metering capacity.

Recording Vacuum Gage

A GROUP of recording high vacuum gages called Televac has been developed by *Precision Scientific Co.*, 1750 N. Springfield Avenue, Chicago 47. Type "MR" instrument with a range of 0-500 microns of absolute pressure utilizes the Televac 600 thermal gage with specially treated elements. Features of the gage include coated filament to prevent off calibration periods due to water, oil vapor or other contaminating vapors. The type "S" recorder for ultra vacuum contains two ranges —0-500 microns for pressures above 1 micron, using the No. 500 thermal gage in this range and an industrial type ionization gage for the range 0 to 0.4 microns. Accurate readings can be obtained down to 10-6 mm. mercury (0.001 micron). A safety circuit which makes it impossible to turn on the ionization gage until a vacuum



of 1 micron has been reached is also featured. Average life of ionization gage is 3000 hr.

High Temperature Thermometer

A MERCURY-IN-GLASS thermometer that will function accurately and reliably at temperatures up to 1275 deg. F. is now offered in standard industrial forms so that a complete line of Princo instruments is now available for such applications as heat treating furnaces, diesel engine exhausts, tin and type-metal pots, galvanizing baths, high temperature superheated steam lines and other processes involving temperatures under 1275 deg. F. according to an announcement by *Precision Thermometer & Instrument Co.*, Philadelphia. The 1250 to 1275 deg. F. thermometer was made possible by the use of a capillary thermometer tubing of a highly refractory "Combustion" glass of high silica content developed by *Corning Glass Works* which replaced the boro-silicates originally used for high temperature thermometers up to 950 deg. F.

Metal Testing Device

FOR comparison of the analysis and heat treatment of ferrous materials, the Ferrograph has been announced by *Allen B. Du Mont Laboratories, Inc.*, 2 Main Avenue, Passaic, N. J. The instrument works on the transformer principle of operation. A 23-cycle exciting current is fed into the primary coil while the output of the secondary is controlled by the magnetic characteristics of a metal sample introduced into the coil. The voltage from the secondary is filtered and the fundamental 23 cycle wave is impressed on the horizontal axis of a cathode-ray tube. The third harmonic is viewed on the vertical axis of the instrument. The first and third harmonics will vary in phase and amplitude with variations in the analysis and heat treatment of steel or iron. The instrument operates on 115 volts, 40-60 cycle.

Pressure Gages

TWO types of spring and bellows actuated pressure gages that measure ranges between 0 and 5 in. and 0 and 50 in. of water have been announced by *Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co.*, Philadlephia. One gage has a single spring for pressure ranges. The other has a second spring in tandem with the first for vacuum and compound ranges. Applications include combustion pressures and steel, petroleum, chemical and aviation engine manufacturing, processing and testing.

TUBES
These are large-diameter tubes of magnesium, which will be fastened under the wings of fighters and bombers, to carry and launch Revere-made rocket projectiles manufactured by us out of our own electric-welded steel tube. In addition to all our other duties as suppliers of plate, sheet, strip, bar, rod, wire, forgings, and special drawn or extruded shapes, we are tube and pipe specialists. Look at this list:
COPPER AND COPPER-BASE ALLOYS
Seamless Tubes • Condenser Tubes • Copper Tube for Water, Oil, and Gas Lines • Dryseal Refrigeration Tubes • Pipe (S.P.S.) • Lock-Seam Tubes • Automobile Tubes • Capillary Tubing • Heat-Control Tubes.
MAGNESIUM ALLOYS
Seamless Tubes • Pipe (S.P.S.) • Rocket Launching Tubes.
ALUMINUM ALLOYS
Seamless Tubes • Lock-Seam Tubes • Pipe (S.P.S.)
STEEL
Electric Welded Tubes • Perforated Tubes • Lock-Seam Tubes.
These tubes are available in all commercial sizes, tempers and finishes. Many of them can be obtained not only round, but also square, rectangular, hexagonal and other shapes.
If you need tube or pipe, remember the full Revere line. There is a Revere distributor near you. He or we will be glad to answer any questions. Address Revere Executive Offices.
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Assembly Line . . . STANLEY H. BRAMS

• Only allocations for materials stand in the way of a resumption on passenger car output . . . Prospects are good for first assemblies during the coming summer.

DETROIT—The automobile industry will be ready to make cars by midsummer. It is a good 50-50 bet that automobiles will begin to come off the assembly lines almost immediately thereafter in halting, erratic quantities. It is a better bet that regularized production, but on a limited basis, will be in effect by the end of this year.

No matter when VE-Day comes—or even if there is no VE-Day as such—its effect on automobile industry reconversion will be solely academic. So far as the auto plants are concerned, the programs laid out by managements and Washington agencies alike are now functioning. From standpoints of production and reconversion planning, VE-Day has come and gone.

And, as a result, the time is late. The auto industry is realizing that its deep satisfaction over the way WPB moved in to permit it to reconvert three weeks ago can well be tempered by the fact that the permission was far too long in transit. This is not entirely chargeable to WPB; the Battle of the Bulge last December, which put a stop on all postwar planning, is the main culprit, if any. But, without regard to 'cause, too many wasted weeks have gone by.

As a result, there will be modest unemployment never anticipated in the private opinions of executives who figured they would have enough lead time to perfect their changeovers. There will be severe stresses imposed by labor and government. There will be unnecessary expense and probably not as solidly grounded work in the turning back to civilian output. There will be needless nerve strain.

Thus far the way has been almost entirely cleared to produce passenger cars. Only allocations for materials are missing. They will not be granted until some weeks hence, when WPB and the military agencies are able to appraise in detail the effects of the past fortnight's cutback and the problems involved in expanding the Japanese War. When they come, the last barrier to reconversion will have been removed. And automobile production will be set up as a formal program—which means that it will not only have its priorities and ratings and allocations, but permission to go ahead as well.

Let it be repeated then: As soon as materials problems are shaken down and studied, modest allocations will be earmarked for auto output. And thereafter the auto industry's reincarnation will come about as soon as present makeready is completed.

The machine tool problem is being whipped. Recent cancellations growing out of arms program cutbacks have reduced some machine tool company order books to two weeks; more to backlogs of only six or eight weeks. Whether a good share of nearly $50,000,000 in automobile orders can fit this open space remains to be seen, but a AA-3 priority will meet most other needs, and those otherwise unobtainable will be rated higher.

The auto companies are now preparing lists of tools now apparently unobtainable in the lead time they figure they have before limited production begins, and will circulate these through the Automotive Council to other companies. Firms holding or knowing of such tools and not using them will pass back the information to the inquiring firms. Efforts will then be made by companies in need to obtain their wants. This presupposes an effort to go around surplus property disposal methods—a system which has not worked out too well up to today—by direct deals between owner agency and would-be buyer. Move to shortcut the rather cumbersome surplus disposal systems are now being made in Washington.

Behind machine tools comes tooling. To date nothing has been done for the tool, die, jig and fixture makers. WPB believes their job is a short term affair which can be handled later, and until the tooling industry convinces them otherwise, this phase of makeready may lag. The tool firms do not need materials or authorizations to go ahead, but they do need protection for and enlargement of their working forces—apparently possible mainly by Area Production Urgency Committee action. To date no area PUC has considered this matter.

TOOLING presupposes facilities. The auto companies are going ahead rapidly to build, under AA-3 priority, some $35,000,000 in new facilities they say they need. The new Fisher Stamping plant near Hamilton, O., costing $5,000,000, is the largest of these. There is some new Dodge construction at Detroit involved. Cadillac space in Detroit is included although this may turn out to be a DPC project. Murray is building

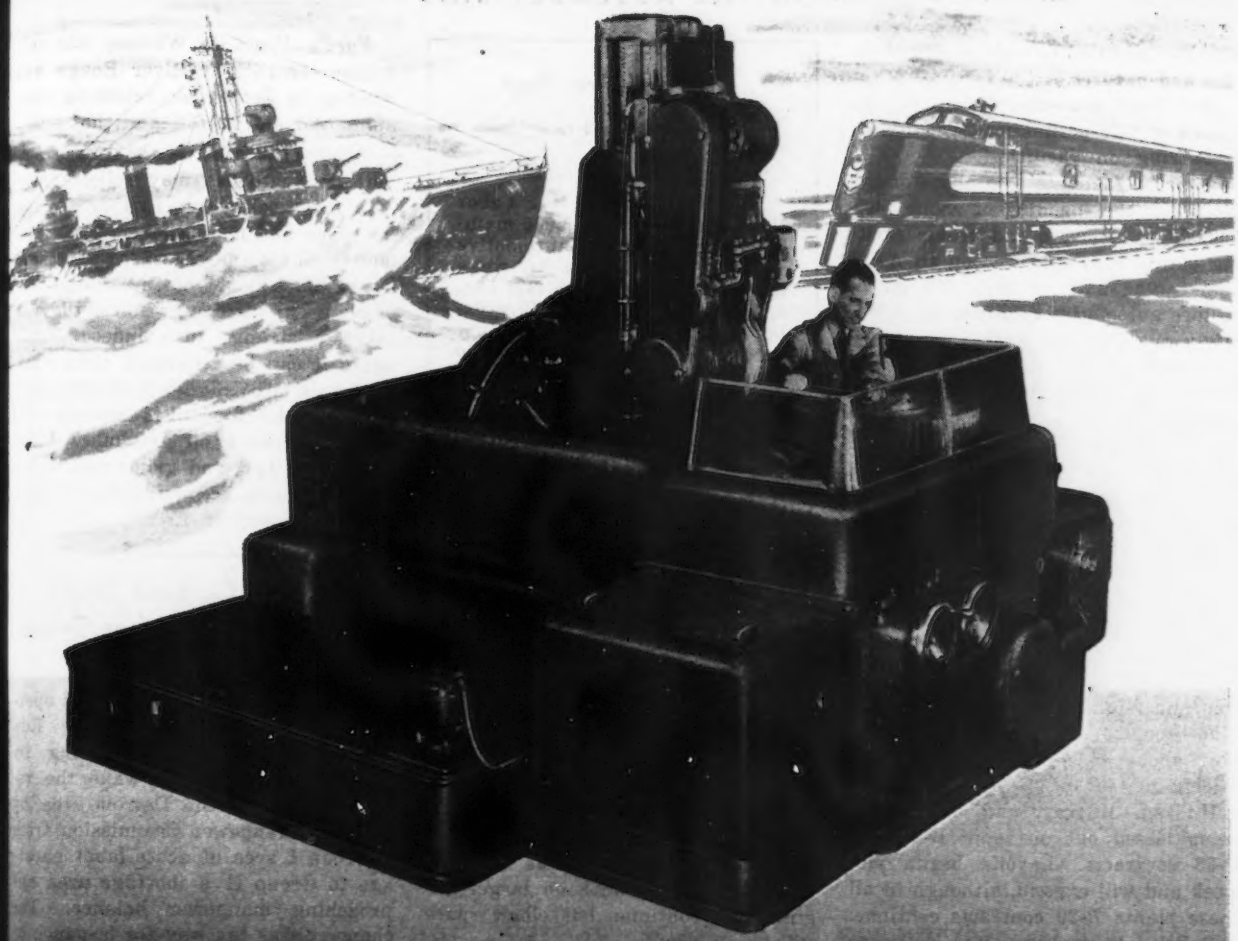
Ford's Purchasing Activities

Detroit

• • • Duties handled by Claude Nelles, who resigned this month as co-director of purchasing at Ford Motor Co., have been split among several persons.

Supervision of general purchasing, hitherto divided between Nelles, Howard C. Kellogg and Charles H. Carroll, will continue under the latter two. Carroll will handle steel buying.

Frank Curtis, assistant supervisor of steel mill production under Nelles, now is supervising it. The Ford planning and scheduling department, headed by George Moss, takes over those duties for the steel mill. The byproducts sales department, headed by Roy Struthers, takes over steel sales.



GRINDING BIG "TEETH" for American Power

W 26" Universal Hydraulic ertical Gear Grinder . . .

e precision gears that swing a battlewagon's guns into position — or transmit smooth- ving power to the driving wheels of diesel- tric locomotives . . . these are the kind of s where this newest Pratt & Whitney gear nder shines.

t works quickly and accurately, holding fine rances which are so necessary for smooth, efficient operation on power drives. Vital war production on Navy gun mounts has already put this huge machine to the test — has shown that precision grinding of these big gears pays dividends in quieter, trouble-free operation, and longer gear life.

Information on the P&W 26" Universal Hydraulic Vertical Gear Grinder is now available and will be supplied upon request. This same machine, without conversion, will grind the big precision gears for peacetime power drives. Find out the details now.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1 • CONNECTICUT

$225,000 addition to make heavy tools, dies and fixtures.

And there are other moves, not involved in this permission, which have a bearing on facilities.

A major factor in this phase of the picture is the spending of about $40,000,000 to renovate and repair existing plants, also approved on an AA-3 basis. The bulk of this will go to restore automotive facilities to plants lately given to war work.

"Lately given" is used advisedly. Detroit is rapidly finding such space available or earmarked as available by midsummer. Detroit is going out of the aircraft business, except for B-29 work, and part of that also may be transferred.

Willow Run, behemoth of all wartime production plants, is being shut down by stages and will wind up producing B-24's by August. Layoff of 21,000 men there will also involve 9,000 others in the River Rouge, Lincoln and Highland Park Ford plants, plus about 25,000 others in Michigan, plus about 45,000 others outside of Michigan.

Hudson, Murray, and Briggs are being closed out on their B-17 and P-38 contracts. Layoffs began last week and will expand, although in all these plants B-29 contracts continue.

DeSoto is moving its Helldiver wing job out of Detroit to the higher tier contractor, in Ohio. Assembly line space will thereby be opened, although B-29 work will remain.

Buick has been cancelled on its Pratt & Whitney B-24 aircraft engine contract; already 3,500 men at Flint and 4,500 at Melrose Park have been laid off. Chevrolet will be cancelled out of this same job at Tonawanda, affecting employment in many Michigan and Indiana plants as well. In both these cases, work on larger engines will continue, but elbow space will be afforded.

At South Bend, Studebaker is tapering sharply on its Wright aircraft engine assignment, and even though it takes on new work, space will open in its plants for non-military work.

Retroactive Pay Awarded

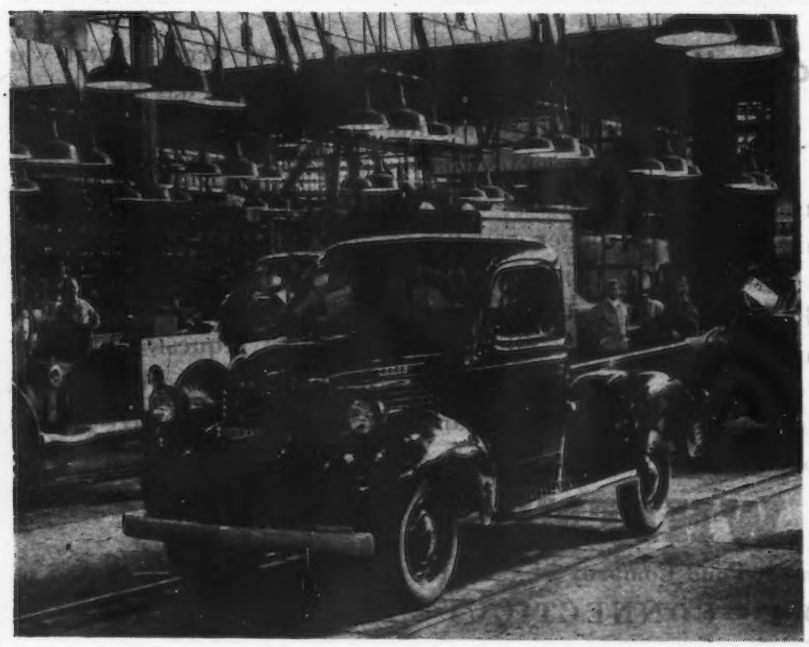
Detroit

• • • **The National War Labor Board has awarded 53,000 maintenance employees in automotive plants a five cent an hr. wage increase retroactive to last Oct. 6, or to the day of certification in cases submitted after that date. The increase amounts to about $7,000,000 a year.**

Maintenance workers are affected in plants of General Motors Corp., Chrysler Corp., Hudson Motor Car Co., Packard Motor Car Co., Briggs Mfg. Co. and Murray Corp. of America.

The United Automobile Workers Union has indicated it will seek comparable raises for 110,000 maintenance workers in other automotive plants.

AFTER THREE YEARS: *For the first time since February, 1942, light trucks are being produced for civilian use. This half-ton pickup job at Dodge is interspersed with military production on all sides, as the assembly line clearly indicates.*



Ford's Pratt & Whitney aircraft engine contract at River Rouge will wind up by September, releasing more manpower and facilities at that point.

Meanwhile, word is that more ammunition cutbacks may follow those of a few weeks back, further freeing up space and manpower in the automotive plants and elsewhere. So there is not much doubt of the availability of plant and manpower unless the war takes a strange turn indeed. Once again it can be reiterated that when materials are allocated to the auto industry the first 1946 models will begin to come off assembly lines cleared of dust and grime and kinks that have been accumulating on them since February of 1942.

Willow Run Cutback Drops Detroit to No. 2 Labor Group

Detroit

• • • **Decision to start cutting operations immediately at Willow Run leading to a complete closing by August brought in its wake the reclassification of the Detroit area by the War Manpower Commission from a Group I area of acute labor shortage to Group II, a shortage area approaching manpower balance. The change opens the way for issuance of new military contracts in the Detroit area.**

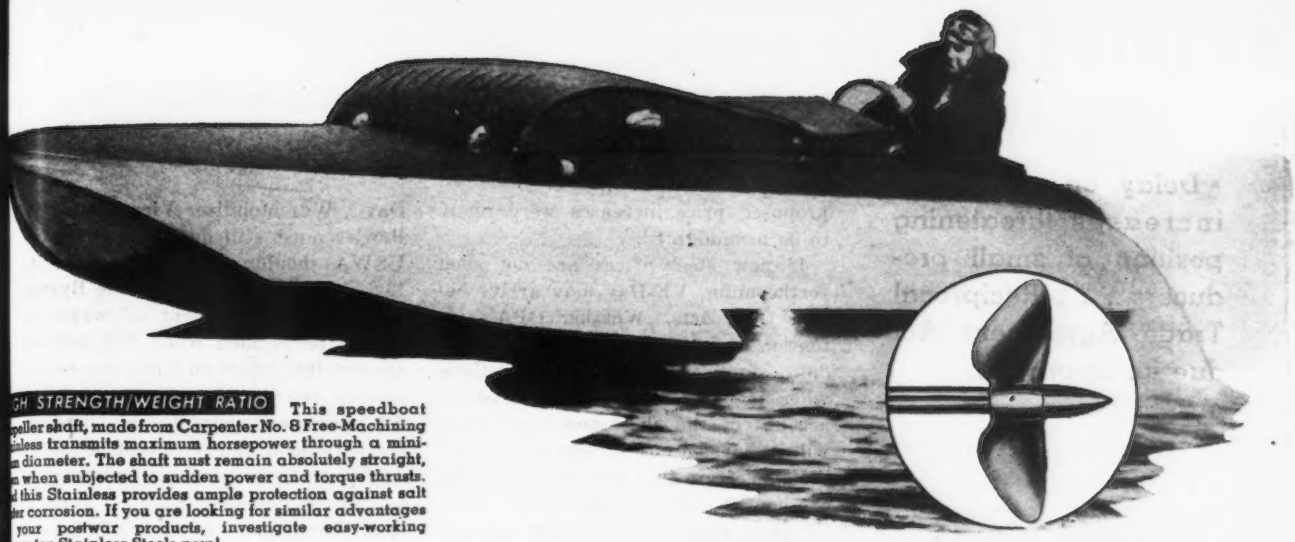
Both labor and industry groups have maintained for some time that Detroit should not be classified as a Group I area, but all controversy on the question was removed when the Willow Run windup brought the prospect of elimination of more than 70,000 jobs in Michigan, probably 50,000 of them in the immediate Detroit area, in the next few months.

Immediately on the change in classification, the area Production Urgency Committee approved $33,000,000 in new Navy contracts for the Detroit area, but these are comparatively minor alongside the aircraft cutbacks.

J. & L. Net Income Up

Pittsburgh

• • • **Jones & Laughlin Steel Corp.** reported for the quarter ended March 31, 1945, a consolidated net income of $2,013,489 after all charges including depreciation, depletion, interest and taxes. This compares with a net income of $1,708,352 for the first quarter of 1944. Federal income and excess tax estimates for the quarter are $3,567,000 as compared with $2,417,000 for the initial quarter last year.

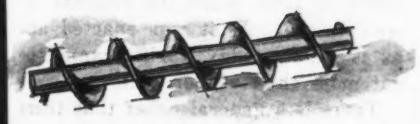


GH STRENGTH/WEIGHT RATIO This speedboat peller shaft, made from Carpenter No. 8 Free-Machining ainless transmits maximum horsepower through a mini- m diameter. The shaft must remain absolutely straight, n when subjected to sudden power and torque thrusts. d this Stainless provides ample protection against salt ter corrosion. If you are looking for similar advantages your postwar products, investigate easy-working rpenter Stainless Steels now!

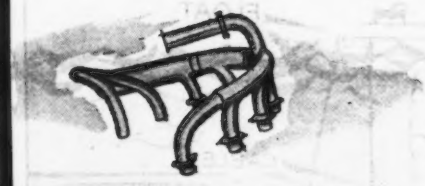
You get corrosion resistance, plus these...

SPECIAL PHYSICALS

with Carpenter Stainless Steels



AR RESISTANCE Stoker worms like this in thousands homes and industrial plants can be installed and for- ten. Carpenter Stainless Steels Nos. 4 & 6 provide the ar and corrosion resistant qualities necessary to keep m constantly on the job.



AT RESISTANCE Carpenter Stainless No. 4-Ti or 4-Cb used in aircraft exhaust manifolds like that wn above, are typical of a variety of Stainless grades l meet specific high temperature service requirements.

Have you considered the many advantages that can be obtained for your new or redesigned products through the special physical properties provided by Carpenter Stainless Steels? Right here may be the answer to giving your postwar products greater utility, broader sales appeal.

Carpenter, as pioneer in the development of soft and ductile Stainless Strip and inventor of Free-Machining Stainless bar stock—has always made a specialty of producing Stainless Steels to do specific jobs. Our experienced representatives can help you select the Carpenter Stainless grades whose physical properties most fully meet your requirements. Careful laboratory control and exacting inspection assure uniformity, lot after lot, in the Stainless you receive.

Call in your nearby Carpenter representative now and take full advantage of his diversified experience in helping to get the best results with Stainless. But do it today, for planning time is getting short.

The Carpenter Steel Company, 121 W. Bern Street, Reading, Pa.

Carpenter STAINLESS STEELS

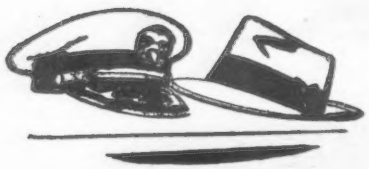
...for
- Strength
- Rigidity
- Heat Resistance
- Corrosion Resistance
- Longer Product Life
- Sales Appeal

BRANCHES AT
Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

Washington . . .

L. W. MOFFETT

• Delay on steel price increases threatening position of small producers . . . Reciprocal Trade Agreement Act due for approval.



WASHINGTON—OPA Administrator Chester Bowles may suffer the fate of Leon Henderson if OPA relations with Congress continue to deteriorate. Senators already are up in arms about the poorness of OPA enforcement attempts against the black market in meat and automobiles, and price policies so restrictive that small meat packers are about to be forced into bankruptcy.

Another more furious storm is about to break over the price agency on account of its delaying tactics with respect to steel prices it promised to adjust. The promise was made in January when interim boosts were granted and OPA said it had to happen as a matter of law to prevent "out-of-pocket" losses to the steel companies on products on which they were consistently losing money.

Last week, the presidents of nearly 30 small steel companies consulted in Pittsburgh to devise some method to convince OPA of their serious financial condition brought on by OPA's dilatory procedure. Nearly all of the companies can show they went into the red, with losses into the hundreds of thousands of dollars for the first quarter of the year. The increase in labor and material costs without price relief promised by OPA threatens the continued existence of small units in the industry, steel men here say.

It is predicted that the red-ink record will go to Congress with the story of how OPA Administrator Bowles changed the rules in the middle of the game and adopted new criteria after proposed price increases were ready to be promulgated.

If new steel prices are not soon forthcoming, VE-Day may arrive before OPA acts. Whether OPA's intention to request new profit and cost data for post-VE-Day operations when labor costs will be reduced on account of the shortened work week will be carried out, no one knows.

It is certain that with cutbacks and consequent reduced operations after VE-Day, steel price increases are not going to be very effective to save those companies threatened with bankruptcy.

Mr. Bowles is said to be surrounded by certain advisers who have been opposed to granting the steel industry a price increase because it is claimed they had been told that a steel price increase would preclude wage increases to CIO-USWA.

Hope has been expressed that the situation be brought to the attention of President Truman. But with the multitude of problems demanding his time in the critical months ahead, the President is expected to leave the matter of OPA investigation and cleaning-out to Congress.

The President, Economic Stabilizer Davis, War Mobilizer Vinson and Mr. Bowles must still decide whether the USWA should get some part of its 17c. an hr. demand. From the Byrnes report this adjustment of wages is due to be decided when VE policies are put into effect on cutbacks, reconversion and demobilization generally. All indications point to this happening very soon and it cannot be imagined that the government will want to aggravate unemployment by forcing small companies to the wall during the adjustment period.

* * *

PRESIDENT TRUMAN, going along with the policy of the late President Roosevelt, did the expected when he endorsed the Reciprocal Trade Agreement Act whose extension and expansion are the subject of hearings before the House Committee on Ways and Means. There is a question, however, whether President Truman will insist on the provision to expand the act to permit reduction in rates up to 75 per cent of those in effect in 1934, when the original act was passed. As it was enacted and as it stands today, tariffs cannot be cut more than 50 per cent.

There is a general belief that there

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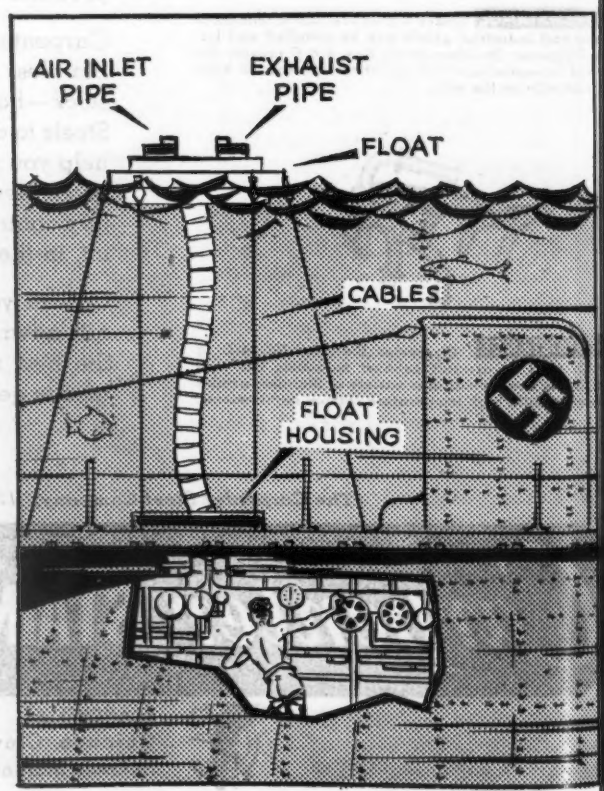
U-BOAT BREATHER: *Among the new submarine developments attributed to the Germans is this system for recharging storage batteries without surfacing. It enables the undersea craft to cruise about a few feet under the surface, as the operation progresses.*



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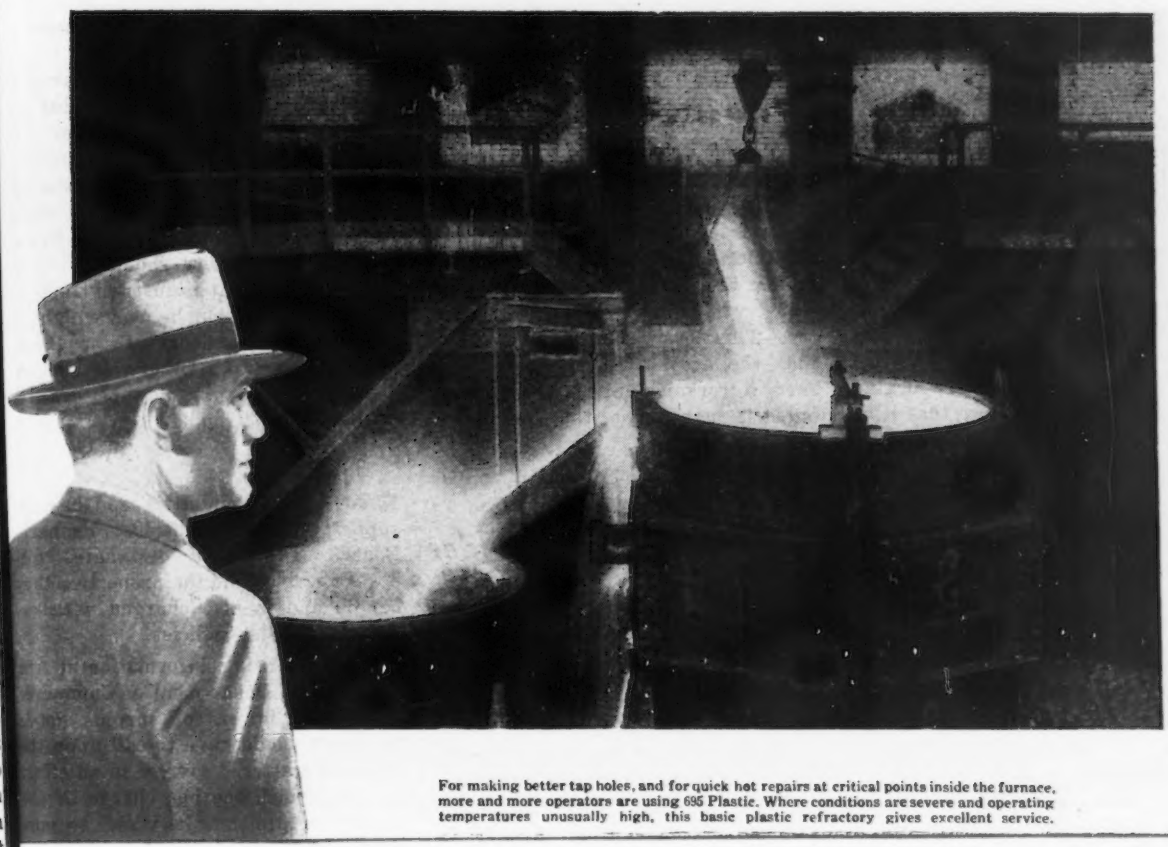

For making better tap holes, and for quick hot repairs at critical points inside the furnace, more and more operators are using 695 Plastic. Where conditions are severe and operating temperatures unusually high, this basic plastic refractory gives excellent service.

IT'S A GOOD PHONE NUMBER TO KNOW

THERE are times when a steel man has his refractory troubles—he may be making tap holes too often, having excess bottom delay time, having too many break-outs, or an old bottom may need a major repair or renewal.

Then is the time to think of the "Basic" Engineer. Just give him a call, and he will be right over. For he's your "First Helper" in any emergency on refractories—he is trained to work that way.

The "Basic" Sales Engineer is different from many of the sales representatives who ask you for business—different in that he is charged specifically with a double responsibility. His first duty is to help his customers to more effective use of refractories, and thus to contribute to increased steel production and lower refractory costs. He works on the theory that if "Basic" products acquit themselves satisfactorily, the orders will be forthcoming, too.

You can always depend on the advice of the "Basic" Engineer, for he is a practical steel man, too. In addition to his sound knowledge of basic refractories, he knows steel production as a man with actual experience in making open hearth and electric furnace steel.

So write his phone number at the top of your list. Comes any emergency, it's a good number to know.

BASIC REFRACTORIES, INCORPORATED 845 HANNA BUILDING *Cleveland 15, Ohio*

would be no great difficulty in extending the present law. But there already is wide opposition in Congress, not entirely confined to Republican members, to the request for authority to slash rates as much as 75 per cent. Hence if President Truman is willing to forego the expansion provision, he likely will not have a tussle with Congress—which he clearly wants to avoid—but he will face opposition if he insists on the right to give the Administration authority to cut rates by as much as 75 per cent. Nevertheless, the Administration is urging with considerable insistence that it be given such authority.

It did so at the outset of the hearings through Secretary of State Edward R. Stettinius, Jr., and Assistant Secretary of State William S. Clayton, who were witnesses before the committee at the opening of the hearings and former Secretary of State Cordell Hull, who addressed a letter to Committee Chairman Robert L. Doughton vigorously urging that the act be extended three years from June 12 with the expansion provision.

The former Secretary of State said that the action of Congress would give a decisive answer to whether the United States was "prepared to assume its share of responsibility for creating the basic conditions upon which enduring peace depends." Secretary of State Stettinius insisted that reversion of this country to what he called its former policy of "economic isolation would again produce world-wide disaster and the threat of future wars."

While he likewise strongly asked for passage of the measure, Mr. Clayton said that no action would be taken under the proposed new authority which would injure American industry. This observation led to comment that the act should be amended to carry a workable anti-dumping clause, but it is doubted that the Administration would accept such an amendment.

Opponents of the new provision, however, insist that the expanded authority if exercised, and they are afraid it will be, would be disastrous to American industry. Some are opposed to the act in its present form, while others, lukewarm toward it, say the added authority should never be granted. So if it is insisted upon by the Administration, a merry fight is in store on the floors of the House and the Senate. Otherwise the extension of the act may be granted without much trouble.

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Surplus Information Centralized by Order

Washington

• • • **Centralization of information** on surplus property is expected to emerge from the transfer by a recent order of President Truman of the Treasury Procurement Division's surplus property activities to the Department of Commerce under Secretary Henry A. Wallace. The Department of Commerce having an agency in each of the 48 states was accepted as the logical source to handle such information. Recommendation to that effect was made some time ago by the Mead Senate Committee and has the support of the Surplus Property Board. The board designates disposal agencies and the properties they handle and is also charged with establishing sales policies.

By centralizing information in the hands of the Department of Commerce prospective buyers of surplus goods no longer would have to call upon the different scattered sources in an effort to learn which one has charge of the product or products he wants to purchase.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

NOW THAT GUN CARRIAGE JOB ON BORING MILL NUMBER 8 SHOULD BE--UH--WELL THEN, THAT WELDIN' JOB FER TANKS OUGHT TO BE--AHEM--UH--THEN THERE'S THAT JOB ON LATHE 5--IT'S TO BE--UH~
I GOT THAT ONE--AND THAT--AND TH' OTHER, SO DON'T YOU WORRY ABOUT ANY OF THEM!
HE'D BE ONE O' TH' BRIGHTEST GUYS IN TH' SHOP IF HE WASN'T SO DUMB--HE'S STUDIED EVERYTHING ELSE BUT PEOPLE!
YEH, I THINK HE MIGHT GO PLACES IF HE LET TH' BOSS THINK THERE WAS SOME USE FER TH' BOSS AROUND HERE!
4-27
J.R.WILLIAMS
THE INTERRUPTER
COPYR. 1945 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.

Killed in Action

Washington

• • • **Hiland G. Batcheller, Jr.,** USNR, son of Hiland G. Batcheller, WPB chief of operations and president of the Allegheny-Ludlum Steel Co., has been killed in action in the far Pacific. He was 23 years of age and left Yale University about 18 months ago to join the Navy. He was serving on a destroyer at the time of his death.

National Names Directors

Pittsburgh

• • • **The National Steel Corp.,** at its annual stockholders meeting elected the following directors: E. T. Weir, chairman, F. W. Blair, Maurice Falk, G. R. Fink, G. M. Humphrey, R. L. Ireland, Jr., T. E. Millsop, E. W. Mudge, E. F. Reed, M. W. Sales, and J. W. Thompson.

Mr. Ireland and Mr. Thompson were newly elected to the board while other directors have served in previous years. Mr. Ireland is president of the Hanna Coal Co. and vice-president of the M. A. Hanna Co. and Mr. Thompson is president of Hanna Ore Co. and vice-president of the M. A. Hanna Co.

More answers to questions

ABOUT PLUNGE GRINDING AND CRUSH DRESSING

• CAN ANY PLANT ADOPT CRUSH DRESSING?

Positively yes, regardless of whether the plant is small or large.

• WHAT ABOUT SMALL PLANTS?

Production requirements may justify the purchase of Sheffield Precision Thread and Form Grinders, Micro-Form Grinders and other equipment offered by Sheffield. Or it is possible that production needs can be met with crusher rolls and mountings available from the Sheffield Corporation, Dayton 1, Ohio, for use on both surface and cylindrical grinders.

• WHAT ABOUT LARGER PLANTS?

Many larger plants can use the entire line of Sheffield crush dressing equipment—Precision Thread and Form Grinder, Micro-Form Grinder and complete surface grinder equipment.

• WHAT ABOUT CRUSHER ROLLS?

They can be obtained from The Sheffield Corporation. Crusher rolls for standard pitch threads are carried in stock—rolls for other pitches and all types of forms are available to specifications.

Crusher rolls for forms are made on the Sheffield Micro-Form Grinder and reproduced in quantity on the Sheffield Precision Thread and Form Grinder. Crusher rolls for threads are made originally and in quantity on the Precision Thread and Form Grinder.

• WHO WILL HELP US APPLY THE PROCESS IN OUR PLANT?

Full knowledge of how crush dressing and plunge grinding are used abroad, plus a number of years' experience producing the equipment and applying the process in this country, are available to you from the staff of The Sheffield Corporation.

• WHERE CAN WE SEE CRUSH DRESSING AND PLUNGE GRINDING IN ACTUAL OPERATION?

Sheffield not only builds Micro-Form Grinders and Precision Thread and Form Grinders, but also uses them in actual production of gages, instruments, machine tools, and in other close tolerance manufacturing work.

Visitors are always welcome at the Sheffield plants, Dayton, Ohio. If you can't come in person, write for Engineering Data.

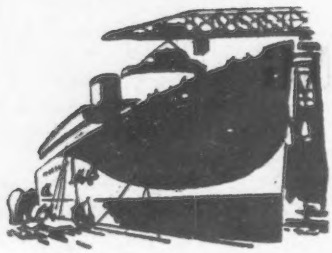
The Sheffield Corporation

Dayton 1, Ohio, U. S. A.

West Coast . . .

OSGOOD MURDOCK

• Coastwide steel committee meets at Los Angeles May 11 to consider growing accumulation of questions . . . Both labor and management anxious to ease out government representatives from the head of their conference table.



LOS ANGELES—As the coastwide steel committee of 15 appointed at Salt Lake in February holds its first meeting here on May 11, it will be confronted not only with the questions that have arisen directly pertaining to the operation of war-born steel plants postwar and the possible (and devoutly hoped) reduction in the price differential for raw steel on the West Coast, but there are also arising myriad general questions connected with imminent transition from the period of fervent war production to that of conversion and reconstruction.

Regional War Manpower officials, who have been prone throughout the war period to deal in six digit figures, have announced that Pacific Coast shipyards and airplane factories will lay off 100,000 workers within the next 90 days, although they "believe that by proper distribution of manpower the net layoff will not exceed 25,000." At its peak shipyard employment reached 554,000 persons and aircraft 305,681 in August 1943. Since that time shipyard employment has declined by 124,000 jobs and aircraft by 104,000. Subtracting 100,000 more by early fall and with the further general understanding that merchant ship construction will be pretty generally completed by the end of the year, the labor market should ease perceptibly with each coming month and the day of transitional unemployment is not far off. Regional Director Fay W. Hunter of WMC pertinently points out that there is every likelihood that skilled and semi-skilled migrant workers will return to their homes in other areas but that the non-skilled migrant workers from the deep South and Southwest are likely to remain since they have attained a living standard never before enjoyed and, now that high wage jobs are no longer available, many are likely to drift and depend upon public aid.

Despite substantial layoffs already, one principal war plant in southern California working on steel shells and bomb parts is desperately in need of 500 additional workers, with machines idle, yet cannot man its plant to capacity. There is still a wide difference between the statistics and the actual situation and the personal equation, as ever, is unbalanced.

SUBSTANTIAL cutbacks have definitely come on aircraft and ordnance contracts. Lockheed and Douglas have given notice that production of B-17 Flying Fortresses will be cut in half over a 60-day period. Lockheed P-38 Lightning Fighters will continue to be built until the end [of] 1945, but production will be tapere[d] gradually starting about the end [of] April. Lockheed continues productio[n] on its Constellation transport for t[he] Army and on the PV medium bomb[er] for the Navy. "An unprecedented ra[te] of production acceleration has be[en] assigned by the Army to the P-[80] Shooting Star jet superfighter" [on] which Lockheed now concentrate[s]. Douglass is accelerating productio[n] on its A-26 Invader bomber at Lo[ng] Beach and the C-54 transport [at] Santa Monica. Its El Segundo fa[c]tory is working on parts and su[b] assemblies for the C-54 and on Na[vy] orders.

In an NLRB election at Northr[op] Aircraft, Inc., 50.4 per cent of t[he] workers voted against any union re[p]resentation for collective bargainin[g]. Favoring CIO United Auto Worke[rs] were 39.9 per cent of the voters a[nd] only 8.2 per cent voted for AFL IA[M].

TWO weeks ago, as reported [in] these columns, AFL Machinis[ts] representatives withdrew from WL[B] complicated employer-employee re[la]tions structure for the airplane [in]

DAWN OF LIBERATION: *As the sun broke through clouds, an invasion armad[a] arrived off Leyte to open the Philippine campaign recently.*

79 PARTS
HARDENED BY THIS "ONE MAN HEAT-TREATING DEPARTMENT"
THE COOPER-BESSEMER CORP., renowned builder of top-quality engines and compressors for vital war and peacetime equipment, is discovering how to reap the benefits of TOCCO Induction Hardening to the fullest extent. Its progressive engineers have scheduled 158 different parts for this versatile "one-man heat-treating department"; are already TOCCO hardening 79 parts, 75 of which are pictured above. Highlights of these operations:
Sizes of parts vary from ½ oz. set screws to 186-lb. cross-head pins.
Materials include SAE 52100, SAE 4615, SAE 1112, SAE 1045, NE 8620 and Meehanite Metals.
Typical time savings: Formerly hardened 100 large wrist pins in 13.5 hrs.; harden 100 in 3.5 hrs.—savi
Push-rod buttons formerly 15 seconds. They're now
valves and other parts
Typical production hardens 1800 pieces
cut set-ups.
Other benefits: eliminates straigh chining. The cu affords favorable
Our experienc in which TOCC
THE OHIO CRANKSHAFT CO
Cleveland, Ohio
Now 142 parts TOCCO-HARDENED by Cooper-Bessemer on one Tocco Machine
186-LB. CROSS-HEAD PIN...
...½-OZ. SET SCREW
...BOTH HARDENED BY SAME TOCCO MACHINE.

...Many Hardened in 1/3 Former Time

THE above report on the TOCCO hardening of 79 parts for Cooper-Bessemer engines and compressors appeared in July, 1943. Since then, the production of 63 more parts has been assigned to this versatile "one-man heat-treating department."

These 142 parts range in size from ½ oz. set screws to 186-lb. cross-head pins. Materials include SAE 52100, SAE 1050 modified, NE 8620, Meehanite, as well as carburized low-carbon, carbon and alloy steels. All are hardened on the same TOCCO machine.

TOCCO cuts the hardening time of many of these parts 75%; eliminates straightening; reduces machining and grinding; provides better working conditions.

Find out how versatile, speedy TOCCO Induction Heating can improve *your* products, step up *your* output and cut *your* costs. The 32-page book, "Results with TOCCO," free on request.

THE OHIO CRANKSHAFT COMPANY · Cleveland 1, Ohio

TOCCO

INDUCTION

HARDENING, BRAZING
ANNEALING, HEATING

dustry in southern California with the statement that labor-management relationships should not be so heavily influenced henceforth by the authority and dominance of government representatives.

Last week in San Francisco 600 top representatives of all principal employers in the Bay area gathered for the first general meeting within the past year of the San Francisco Employers Council. This organization was established six or seven years ago for organized, intelligent, enlighted and coordinated collective bargaining with labor. Mayor Roger Lapham was principal speaker. He was facing the problems of the forthcoming transition period with its release from restraint and its surrender of wartime regimentation to peacetime normal economy, a difficult but exciting era just around the bend.

"Relations between labor and employers will do better and be on a more solid foundation in the long run if government is not sitting at the head of the table," he declared.

Roger Lapham was president of the American Hawaiian Steamship Co. and one of the principal leaders among the employers during the desperate and bitter waterfront strikes in the early '30's. He and his associates learned the hard way and followed labor's lead in perfecting a federation of employer groups for intelligent and effective collective bargaining. It is his belief, shared by several thousand members of the council, that the San Francisco Bay area is now well ahead of the rest of the country in handling its management-labor relationships. Mr. Lapham served as a member of the War Labor Board in Washington from March '41 until June '43 and was elected mayor that fall to take office in January, 1944.

Both he and George O. Bahrs, president of the council and one of the management members of the Tenth Regional War Labor Board are agreed that the "liberality and progressiveness" of WLB in its tenth region have tended to pass from the area of control to that of reform. NLB recently vacated an order of its board in this region that certain contracts be let to union shops only, preferably those organized under CIO. In a number of cases holidays with pay, sick leave and other social benefits have been ordered even though they have not been common of prewar practice within the industries and trades affected.

Apparently, both from the side of labor and of management, there is a growing resolve that postwar relationships will be on a sounder basis if they can be handled more generally bi-partite rather than tri-partite. The proper function of representatives and agencies of the public should be to protect the public's interest from the sidelines and with orderly power of review, rather than as the dominant, zealous and impetuous influence.

SEATTLE—A method of making butyl alcohol out of wood waste, developed by Dr. Bror L. Grondal of the University of Washington and Major Henry Berger, research chemist, promises major by-products and relief from a pressing pollution problem in the pulp industry throughout the Pacific Northwest. By a progressive process of precipitation, fermentation and distillation waste sulphite liquor is reduced to a component of great interest to the plastic industries, paint and laquer makers, synthetic rubber production, fuel dealers and dairy farmers. These industries have previously depended upon molasses for their alcohol and will welcome butyl, a fuel with the qualities of wood and looking like coal can be extracted from the sulphite liquid.

During past years wood pulp manufacturers have spent well over $300,000 to develop a process to use sulphite liquid and prevent pollution of the waters of Puget Sound so injurious to the fishing industry. The liquor has been dumped into the sound at the rate of 1700 tons a day and under the new process it is said that this can be processed into 192 tons of fuel daily.

A general light metals conference under the auspices of the Western States Council has been set for Seattle June 21 and 22 when engineers and research men will join with representatives of far western industry and both public and private power to tackle the delicate, difficult though significant subject of electro-metallurgy, principally aluminum. James E. Louttit, manager of the industrial department of the Seattle Chamber of Commerce and formerly engineer and operating executive with the Ohio Ferro-Alloys Corp. is responsible for the arrangements.

A muttering, unhappy undercurrent of protest has re-echoed throughout the Pacific Northwest since the announcement in March that the federal government had contracted with Canadian Aluminum Co. for the delivery of 250,000,000 lb. of aluminum from the Shipshaw plant. Every plus pound from Canada is interpreted as a minus pound from the DPC plants on the Columbia River and in western Washington. Concurrently Bonneville Power Administrator Paul J. Raver has been urging concerted action by northwest civic, business and industrial leaders to secure immediately manpower necessary to reopen two potlines at the Troutdale aluminum plant. Most observers in this area feel that other factors than a couple of hundred persons recruited by civic, business and industrial leaders prevent and discourage the operation of local aluminum capacity. It is increasingly apparent that cheap power alone will not keep all these war plants open and operating. Skeptical and realistic opinion seems to indicate that the privately-owned plants of Alcoa, Reynolds and Olin have a pretty sure and substantial future but that the DPC plants, so dear to the Bonneville Power Administration, are not so favored by Metals Reserve or WPB, and that their immediate prospects are dismal though their long run utility may prove itself.

So the June light metal conference will have plenty of problems and a spirited agenda.

War Contracts Rise In West Coast Area

San Francisco

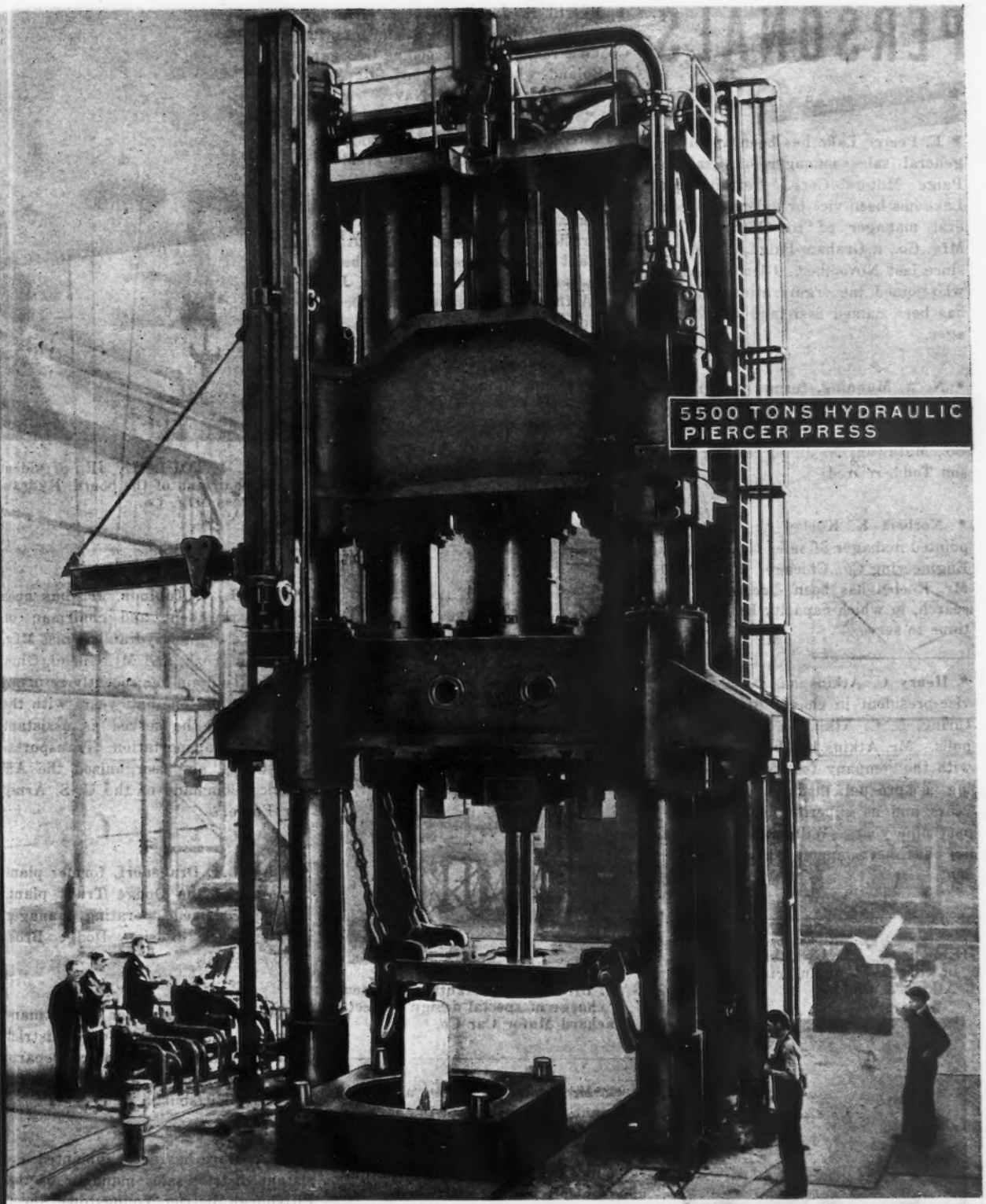
• • • Supply contracts placed in California for the war period through February had a total cumulative value of $17,043,020,000, up $603,204,000 over the year-end figures, according to the War Production Board. Aircraft contracts reached $10,092,927,000, up $205,676,000 for the two months, while ship contracts totaled $4,667,401,000, up $226,717,000.

For the San Francisco Bay Area only the cumulative contract total reached $3,611,589,000 at the end of February, up $187,262,000 for the two months. Ship contracts accounted for $2,822,291,000 of the total, up $136,670,000 for the two months.

Magnesium Literature Search

Boston

• • • An extensive search of technical and trade literature for information on magnesium and its alloys is being conducted by the Factory Mutual Research Corp. here under authorization of the U. S. Army Air Forces.



HYDROPRESS · INC.

ENGINEERS CONTRACTORS

HYDRAULIC PRESSES · ROLLING MILLS
STRETCHERS · PUMPS · ACCUMULATORS

570 LEXINGTON AVENUE · NEW YORK · N Y

PERSONALS

o o o

• **E. Peerce Lake** has been appointed general sales manager of Graham-Paige Motors Corp., Detroit. Mr. Lake has been vice-president and general manager of the Warren City Mfg. Co., a Graham-Paige subsidiary, since last November. **Glen L. Logan**, who joined the organization in 1943, has been named assistant sales manager.

• **N. A. Munning**, formerly assistant treasurer, has been elected secretary of the Hanson-Van Winkle-Munning Co., Matawan, N. J., succeeding **Nelson Todd**, retired.

• **Norbert K. Koebel** has been appointed manager of sales for Lindberg Engineering Co., Chicago. Since 1940 Mr. Koebel has been director of research, in which capacity he will continue to serve.

• **Henry C. Atkins** has been elected vice-president in charge of manufacturing, E. C. Atkins & Co., Indianapolis. Mr. Atkins has been connected with the company for 23 years, serving as production manager for six years and as superintendent for the past nine years. **William E. McCartney** has been appointed superintendent.

HENRY C. ATKINS, vice-president in charge of manufacturing, E. C. Atkins & Co.

• **Merrill S. June** has been elected president of the Warren Steam Pump Co., Warren, Mass., succeeding **George R. Roland**, who has resigned to enter the service of the U. S. Navy.

• **Lester N. Selig**, formerly president, has been elected to the newly created position of vice-chairman of the General American Transportation Corp., Chicago; **Sam Laud**, a director of the corporation and previously executive assistant to the president, has been elected president; **W. S. Hefferan, Jr.**, and **Arthur W. Lissauer** have been elected vice-presidents; **Maurice J. Feldman**, secretary, and **Frank E. Selz** has been appointed an assistant to the president.

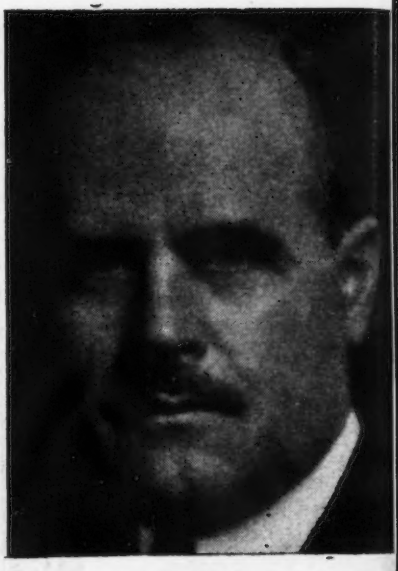
• **J. L. Maddocks** has joined the Barium Steel Corp., New York, as manager of the Washington office.

G. H. BRODIE, assistant to president in charge of special design projects, Packard Motor Car Co.

• **G. H. Brodie** has been appointed assistant to the president in charge of special design projects, the Packard Motor Car Co., Detroit. In his new capacity, Mr. Brodie will also continue as point-of-contact with Army and Navy officials on the company's two war-engine programs.

• **Stanley Hawley**, previously general superintendent of the machine division, has been named works manager of the automotive division, Willys-Overland Motors, Inc., Toledo.

• **E. D. Wolf** has been appointed sales manager of the Michigan Broach Co., Detroit.



COL. H. A. TOULMIN, JR., president and chairman of the board, Hydraulic Press Mfg. Co.

• **Col. H. A. Toulmin, Jr.**, has been elected president and chairman of the board of the Hydraulic Press Mfg. Co., New York, and Mt. Gilead, Ohio. Colonel Toulmin has recently returned from two and one-half years with the Army where he served as assistant chief of transportation, Transportation Corps, and reorganized the Air Service Command of the U. S. Army Air Force.

• **Russell H. Dragsdorf**, former plant manager of the Dodge Truck plant, has been named operating manager of the truck division, Dodge Bros. Corp., Detroit.

• **Peter L. Lenz** has been named manager of the Pacific Coast district Manufacturing and Repair Department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

• **A. A. Hare** has been appointed assistant district sales manager of the Pittsburgh district, Youngstown Sheet & Tube Co., Youngstown, Ohio.

• **David E. Acker** has joined the staff of Arthur D. Little, Inc., Cambridge, Mass.

• **Joe J. Gilger** has been appointed branch manager of the Buffalo office of the Truscon Steel Co., Cleveland, succeeding **Andrew O. Stilwell**.

A BETTER ROTOR
A BETTER MOTOR

ONLY A FAIRBANKS-MORSE MOTOR HAS THE EXCLUSIVE

***Copperspun* ROTOR**

Centrifugally Cast in One Piece and of Copper

It took *years* to develop the Fairbanks-Morse centrifugally-cast, one-piece copper rotor. But it's worth it. Reduced operating costs and longer, more dependable service are the results.

But those aren't the only advantages you get in a Fairbanks-Morse Motor. There's a long list of other features that all add up to *better* service for you. Note the list below. That's why we call it tomorrow's motor today.

Check List of Plus Features

Protected Frame— Dripping liquids and falling particles excluded in any mounting position.

Symmetrical Design— Reversible frame provides for locating conduit box on either side. Bearing arms can be mounted in any one of four positions 90° apart.

Crossflow Ventilation— Another exclusive feature in frames 224 to 365 inclusive. Air moves in both directions, providing a motor of uniform temperature. No hot spots.

Recessed Conduit Box— An innovation for neat installations. Choice of conventional box or frame recess with cover flush with frame.

Balanced Characteristics— Motor rated 40°C with high efficiency and power factor and excellent starting and accelerating torques.

Ball Bearings— Sealed in and protected.

Write for information, Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

BUY MORE WAR BONDS

Fairbanks-Morse

A name worth remembering

Diesel Locomotives • Diesel Engines • Generators • Motors • Pumps • Scales
Magnetos • Stokers • Railroad Motor Cars and Standpipes • Farm Equipment

ELMER GREENE, senior vice-president, Ferry Cap & Set Screw Co.

• **Elmer Greene,** formerly vice-president in charge of manufacturing, has been elected senior vice-president and consultant on factory matters of the Ferry Cap & Set Screw Co., Cleveland. **Maj. John R. Haysak,** recently returned from Army service, succeeds Mr. Greene; **William J. Murphy** has been named assistant comptroller and **Dan J. Cantillon,** sales engineer in the industrial sales division.

• **Paul D. Berry** has been elected an assistant treasurer of the American Rolling Mill Co., Middletown, Ohio.

• **W. O. Springer** has been appointed manager of the Cleveland steel-service plant, Joseph T. Ryerson & Son, Inc., Chicago. For the past 15 years Mr. Springer has been in charge of the company's Cleveland Special Steels Division.

• **Kenneth I. Thompson,** formerly western manager of the Railroad Department, Ingersoll-Rand Co., has joined the sales staff of The Oxweld Railroad Service Co., New York, as eastern sales manager.

• **Armon N. French** has been appointed assistant sales manager of the Wickwire Spencer Metallurgical Corp., Newark, N. J.

• **Henry S. Freynik** has been named chief metallurgist of the Riverside Metal Co., Riverside, N. J.

• **Allan M. Cameron** has been appointed general manager of equipment development and manufacturing, Continental Can Co., New York. **W. W. Tomkins** and **G. E. Nelson** have been appointed assistants to the general manager and will assist Mr. Cameron on technical and administrative matters.

• **Clarence W. Wynn,** formerly assistant manager, has been named manager of industrial relations for the Tubular Alloy Steel Division, U. S. Steel Corp., Gary, Ind., succeeding **Gray D. Hobby,** who has been transferred to a similar position in the company's Lorain works.

• **Myron E. Capouch** has been appointed assistant manager of the wire rope and construction materials division at Cleveland for the American Steel & Wire Co., succeeding **B. S. Pease,** retired.

• **Lawrence Halleran,** until recently assistant supervisor of the Alloy Wire Mill, Callite Tungsten Corp., Union City, N. J., has been appointed sales manager of the firm's Wire Division, succeeding **Harold M. Malm,** resigned.

• **William S. Cowan** has been appointed farm sales manager of the Northwestern District, Westinghouse Electric Supply Co., New York.

• **Dave Smith** has joined the oilfield division of the Western Gear Works, Seattle.

• **A. R. Bowlzer** has been named manager of the newly-formed sales promotion department, The B. F. Goodrich Co., Akron, Ohio.

JOHN L. YOUNG, vice-president in charge of engineering, National Tube Co.

• **John L. Young,** previously vice-president in charge of industrial research and development of the United Engineering & Foundry Co., has been elected to the newly created post of vice-president in charge of engineering, National Tube Co., Pittsburgh, a U. S. Steel Corp., subsidiary.

• **J. E. N. Hume** and **J. W. Belanger** have been named assistant managers of sales, Apparatus Department, General Electric Co., Schenectady, N. Y.; **Karl H. Runkle** has been named manager of the industrial divisions to succeed **Mr. Hume; R. S. Neblett** has been named federal and marine divisions manager to succeed Mr. Belanger, and **W. V. O'Brien** has been appointed manager of the Central Station divisions, succeeding **H. V. Erben.**

OBITUARY...

• **Herman L. Hirt,** assistant to the president of the International General Electric Co., New York, died suddenly April 11 at the age of 41.

• **Frank L. Williams,** president of the Hamilton Emery & Corundum Co., Chester, Mass., since 1915, died in Ridgewood, N. J., April 10.

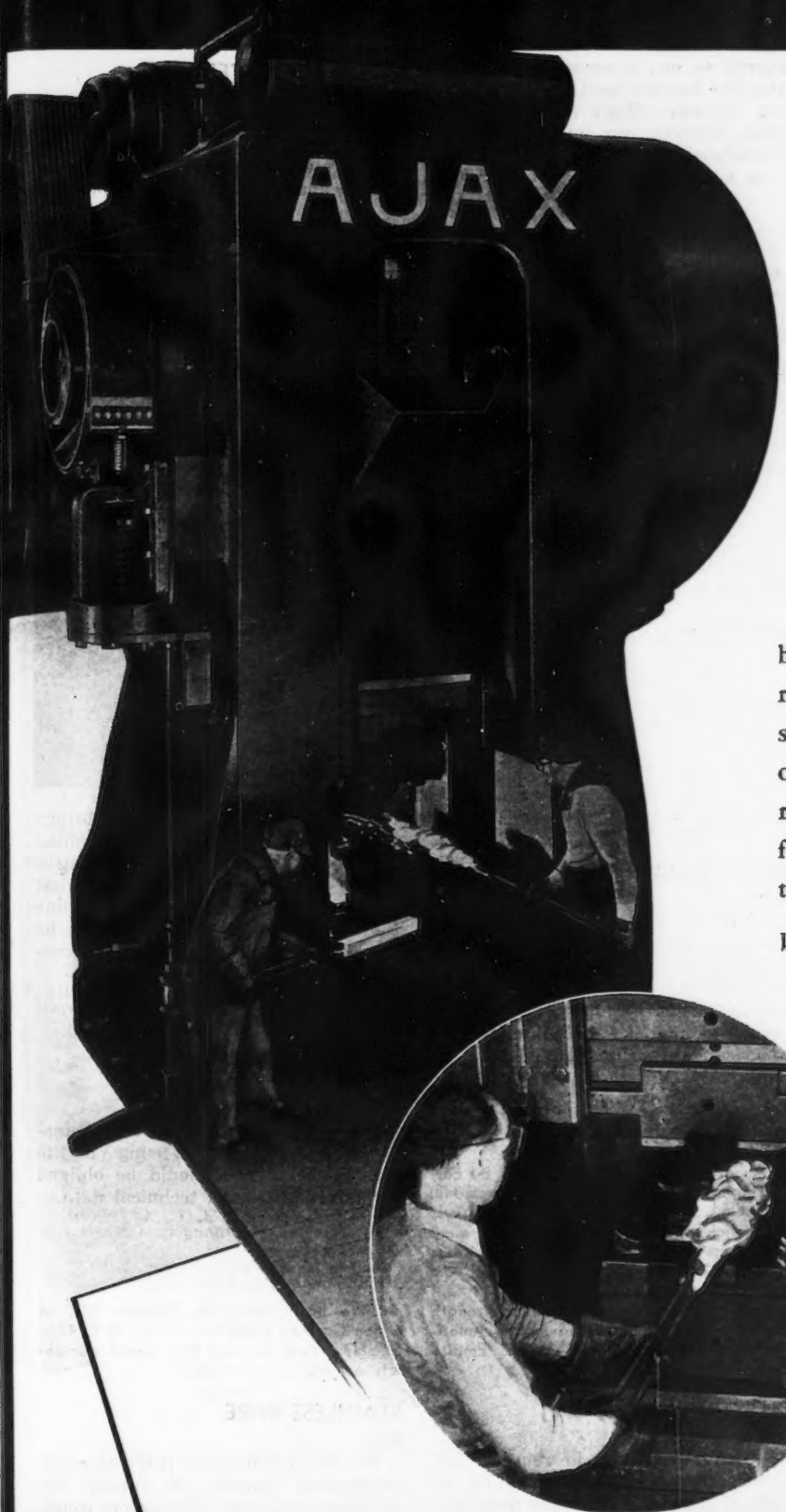
• **G. Tell Dubois,** 55, district sales manager of the Potter & Johnston Machine Co., Pawtucket, R. I., died April 3.

• **Ben B. Daggett,** president of the F. C. Thornton Co., Cleveland, died April 10.

• **E. G. Howell,** scrap broker associated with John T. McEnroe Co., Chicago, and some years ago a partner in the firm of Erman, Howell & Co., died recently.

• **Dr. Mortimer J. Brown,** 62, former chief chemist and works manager of the Niagara Electro Chemical Co. and vice-president of the Roessler & Hasslacher Co., died in Niagara Falls April 8.

The Economy of Press Forging utomobile and Tractor Crankshafts



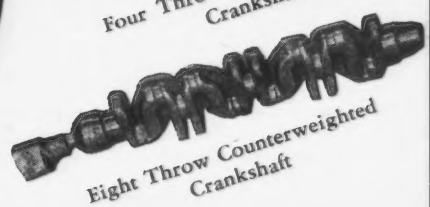
Recent successful developments in press forging automobile and tractor crankshafts on Ajax High Speed Forging Presses have proved that these important parts can be press forged as advantageously as numerous other parts are now being so efficiently press forged.

The results of these extensive tests show that four, six or eight-cylinder crankshafts, with or without counterweights, can be forged from either billet or pre-rolled stock at high production speeds with less exertion on the part of the operator and with less skill required of the operator because of the fewer number of blows required and the far greater simplicity of operation.

Write for Bulletin No. 75

Four Throw Crankshaft

Four Throw Counterweighted Crankshaft



Eight Throw Counterweighted Crankshaft

AJAX

MANUFACTURING COMPANY

EUCLID BRANCH P. O. CLEVELAND 17, OHIO

621 MARQUETTE BUILDING • CHICAGO 3, ILLINOIS

Dear Editor:

INDIUM PRICES

Sir:

Since your item on Oct. 26 about the drop in price of Indium to $4.50 per troy ounce, other quotations for this metal have remained at $7.50. We are most interested in the market for Indium metal, and would very much appreciate any information which would explain the difference between these quotations.

ARTHUR TURNER,
Technical Librarian
Consolidated Mining & Smelting Co. of Canada Ltd.
Trail, British Columbia, Canada

● This metal has come down in price drastically in recent years as recovery methods have been refined and its use has been expanded. The price we quote is based upon confirmation by two producers and there have been no developments since to require its upward revision. Prices we quote are, if possible, based upon actual transactions and not upon what might be considered list prices.—Ed.

FILE BLANKS

Sir:

May we ask you to recommend literature on manufacturing processes for file blanks?

W. KAUDERS
Hydropress, Inc.,
570 Lexington Ave., New York

● There are few manufacturers of mill files and the like, and the process is such an old established one that we doubt that anything can be found in recent literature. We think you will find that file blanks are sheared or blanked out of high carbon steel strip in the conventional blanking press. Some of the shaped files are undoubtedly hot forged and it is probable that the tangs are hammer forged or swaged. Some reference to the manufacture of files might be found by a library research on articles or books published 40 to 50 years ago.—Ed.

PRECISION CASTINGS

Sir:

We are much interested in your March 1 article, "Casting Cutting Tools from High Speed Steel Scrap" by J. Albin. We note reference to previous articles on "Precision Casting of Turbosuperchargers," "Industrial Precision Casting by a Manufacturing Jeweler," and "Equipment and Material for Precision Casting." If you have reprints of these articles, we would appreciate having copies.

C. F. PASCOE,
Assistant General Manager
Canadian Car & Foundry Co., Ltd.,
Foundry Division, Montreal, Canada

● A compilation of 7 articles including those mentioned, called "Precision Casting —Lost Wax Process," is available at 50c. per copy.—Ed.

ELECTROSTATIC PAINTING

Sir:

We have evolved a similar apparatus as that described in "Electrostatic Spraying & Detearing," by Harry Forsberg, Esq., in the issue of Oct. 19, 1944. Although the possibility of electrostatic spraying had occurred to me, experimentation along this line has not been undertaken during the war. Since reading this article, however, our interest has been stimulated and we should like to procure additional data.

L. J. THOMAS,
General Manager
General Mfg. & Distributing Co.,
Sydney, Australia

● We have asked Harper J. Ransburg Co., Indianapolis 7, Ind., to communicate with you. This company developed the apparatus described in the article.—Ed.

HOT DIP GALVANIZERS

Sir:

Could you inform us of firms in the Detroit area equipped to do hot dip galvanizing?

D. S. BRADY,
Tool Engineer
Metrical Laboratories, Inc.,
Ann Arbor, Mich.

● The names of hot dip galvanizers in Detroit are on the way.—Ed.

THIN WALL TUBING

Sir:

Can you furnish me with a list of manufacturers or fabricators of welded thin wall steel tubing?

M. POTEMKIN
Duro Metal Products, Inc.,
Providence, R. I.

● A list of thin wall tubing manufacturers is on the way.—Ed.

GEAR DESIGN

Sir:

I have read the article "Increasing Fatigue Life of Heat Treated Gears" in the March 1 issue. Can you advise me where information on gear design and finish can be obtained? If possible, I should like to contact several American authorities on gears.

J. J. LAUDIG
Research Engineer
Delaware, Lackawanna & Western R.R. Co.,
Scranton, Pa.

● An excellent text is Spur Gears by Earl Buckingham, published by McGraw-Hill Book Co., 330 West 42nd St., New York. The articles, "Mechanical & Metallurgical Advantage of Shot Peening," in our issues of March 29 and April 5, and "Shaved Aircraft Engine Gears," April 12 and 19, will also be of interest. Data on gear strength and durability are published by the American Gear Manufacturers' Assoc., Empire Bldg., Pittsburgh.—Ed.

PALESTINE AGENT

Sir:

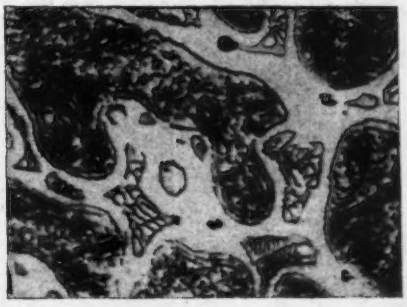
We are interested in representing manufacturers and exporters of all kinds of hardware, machine tools and raw materials. We should be pleased if you could recommend us to factories and exporters who wish to reach our market. We would like to receive catalogs, prices, conditions of sale, and full particulars regarding business activities. We intend to arrange payment against letters of credit.

KARLSTADT
J & A Karlstadt,
P. O. B. 421, Tel-Aviv, Palestine

CAST TOOL STEEL

Sir:

Here are photomicrographs, at 500 dia., of a precision cast 18-4-1 high speed steel showing the structure as-cast, above; and after annealing,



hardening and tempering. This brings out the point raised by Mr. Epremian of General Electric Co. in his letter to the editor published April 5, that heat treatment alone will not refine the structure, so the alloy must be forged or rolled to break up the carbide network.

B. F. SHEPHERD,
Chief Metallurgist
Ingersoll-Rand Co.,
Phillipsburg, N. J.

TRANSPARENT TEMPLATES

Sir:

We are interested in the transparent template process using Vinylite plastic sheets and should be obliged for information and technical data.

A. C. ATTENDU,
Works Manager, Aircraft Div.
Turcot Aircraft,
Canadian Car & Foundry Co., Ltd.
621 W. Craig St., Montreal

● We have asked the Bakelite Div. of Union Carbide & Carbon Corp., 30 E. 42nd St., New York, to send their latest pamphlets on this subject.—Ed.

STAINLESS WIRE

Sir:

We would appreciate it if you could recommend sources of supply for stainless steel wire. The orders would be covered with a priority.

WILLIAM SCHMITZ,
President
S & M Machine Works, Inc.,
614 N. E. 79 St., Miami 38, Fla.

● A list of suppliers is on the way.—Ed.

Measure of a good spring

—is the company it keeps!

Schwitzer-Cummins is another great name on the long list of Muehlhausen customers. Muehlhausen Springs are one of the quality parts contributing to the famous reputation of this Company's products.

The use of the right spring is vital to sustain the reputation of any company's products. This is necessary today in supplying superior equipment for our tanks, trucks, planes, ships, tractors. It will be particularly true tomorrow in peace-time applications.

MUEHLHAUSEN SPRING CORPORATION
(Division of Standard Steel Spring Company)
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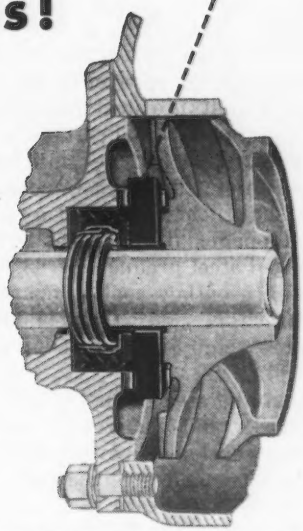


SCHWITZER-CUMMINS AQUA-TITE SEAL

Four million Aqua-Tite Seals in one year is the record of Schwitzer-Cummins. That's a lot of seals, and such production called for a multitude of specially designed Muehlhausen Springs. Such large volume indicates the satisfactory performance of this spring-designed seal on heavy-duty trucks, tanks, combat cars, amphibious vehicles.

SCHWITZER-CUMMINS AND MUEHLHAUSEN ADD QUALITY

TO SCORES OF WELL-KNOWN PRODUCTS!

***To improve product performance, use* MUEHLHAUSEN Designed SPRINGS**

This Industrial Week

- **Order Volume Stays High Despite War News**
- **OPA Promises Steel Price Action by May 1**
- **Steel Ingot Operations Reach 95 Per Cent**

DESPITE cutbacks, talk of further cutbacks and the avalanche of optimistic war news, activity on the steel front this week showed no retreat and most steel companies were reporting little or no change in the heavy volume of steel orders. Main exception to this trend was the demand for steel plates which is dwindling fast, especially in view of Maritime Commission cancellations reported to involve 100,000 tons of plates.

Both at Pittsburgh and at Chicago, steel order volume was, this past week, still substantially ahead of actual shipments. Little easing so far has been reported in the pressure for shell steel, even though it is expected that a considerable amount of this tonnage on the books for future shipment will eventually be cancelled. Restoration of some steel tonnage allotted railroad carbuilders for the second quarter which had been severely cut apparently has been made. How this tonnage will fit into steel mill schedules is still not clear.

Unauthorized coal strikes in recent weeks have to some extent enlarged steel mill backlogs at those plants most severely affected. Carnegie-Illinois Steel Corp. at Pittsburgh has reported as a direct result of coal mine stoppages an ingot loss of 83,000 tons and a loss in finished steel products of 82,000 tons. At Birmingham where outlaw coal stoppages were still affecting the war effort, more than 40,000 tons of steel ingots and more than 58,000 tons of pig iron have already been lost.

That the steel industry will soon feel the impact of cutbacks and changes in military programs is a foregone conclusion, even though present levels in order volume and steel output continue high. Some undercurrents indicate that a calmer market is likely to set in within the near future. The Maritime Commission is checking new requirements against existing inventories. Furthermore its cancellation of 30 tankers out of a program covering 126 may be an advance notice of further trimming.

SOME steel producers report activity among competing sales representatives. WPB appears to be withholding third quarter directives and is being cautious in issuing fourth quarter allotments. Interpretation of this action, however, could easily hinge upon a desire to retain directives for emergency situations and recognition that fourth quarter bookings on many products already are close to capacity. Reports from Washington say that WPB is preparing plans which will give essential civilian needs a high priority rating similar to that used for urgent war items. Such action, however, will probably not materialize until the full effects of cutbacks, already made and those contemplated, are known.

Some sizeable postwar inquiries have been received from steel companies both from the automotive and appliance field. In Illinois the state has asked for bids on the first highway project involving more than 100 tons of structural steel in more than two and a half years. An avalanche of orders from the automotive industry is prevented only by the fact that allocations for materials for the resumption of passenger car output have not yet been made.

Bids are being taken by Jefferson, Ind., quartermaster depot for portable shelters which will require 30,000 tons per month of 26 gage corrugated sheets and 12 and 18 gage supports. The total order is for 150,000 units.

By the end of June few wide strip mills will be carrying any important tonnage of steel plant. Removal of cancelled Maritime tonnage from schedules will, with some mills, jeopardize present near capacity operating rates. Because of the finishing bottlenecks, the plate reduction will not make possible a complete substitution of an equivalent sheet tonnage, despite the overwhelming sheet steel backlogs.

WITH the steel industry up in arms at OPA's delay in fulfilling its long overdue promise to adjust steel prices, the need for price relief was of prime interest in the steel industry this week. While the reason for the delay remains a mystery even though many quarters seem to have an inside track on the whys and wherefores, it is known that the Iron and Steel Advisory Committee has been told by OPA that the whole problem will be settled with upward price adjustments on or about May 1. Whether this promise holds goods remains to be seen, but an actual commitment to this effect has put OPA on record. The industry claims to be losing money on 70 per cent of its carbon steel products.

WPB has allocated 5500 tons of carbon steel for waterways transportation purposes in addition to 14,077 previously assigned for the second quarter of 1945. The steel is to be used in building barges and towboats for private carrier use on the inland waterways.

Railroad inquiries include 100 70-ton gondolas for the Chicago Short Line Railroad and 100 50-ton aluminum sheathed box cars for the Missouri Pacific. It is understood that Santa Fe is considering repairing 750 stock cars and 1000 box cars during the second half of this year.

The National steel ingot operations have gained one and a half points this week to 95 per cent, from last week's revised rate of 93.5 per cent. In Pittsburgh, the operating rate has gained six points to 92 per cent from last week's revised rate of 86 per cent. Youngstown operations are up one and a half points to 95 per cent, and at Cleveland the ingot output is up a point to 101 per cent. Other district gains include Buffalo up two points to 106.5 per cent; Cincinnati up four points to 104; and Southern, still suffering from the coal strike, up 21 points to 70 per cent, from last week's revised rate of 49 per cent. Philadelphia at 95.5; Wheeling at 89; Detroit at 97.5; Western at 86.5; St. Louis at 94.5 and the Eastern District at 105.5 per cent continue unchanged.

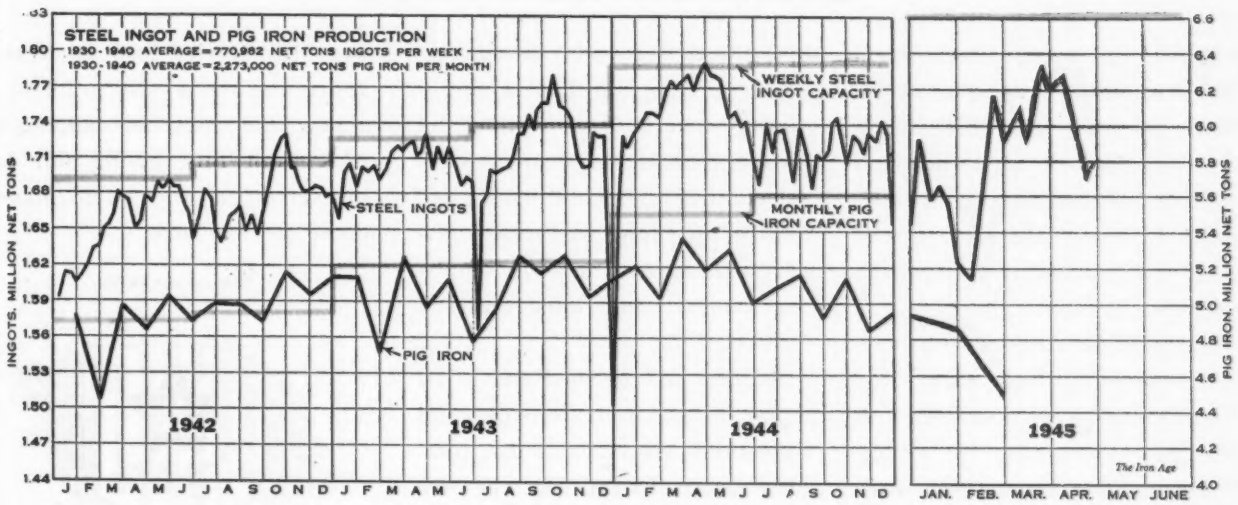
• **TEMPORARY STEEL RESTRICTIONS** — Designed to bring about a 20 per cent reduction in the use of steel for maintenance, repair and operations purposes, WPB has imposed temporary restrictions on purchases of steel for maintenance, repair and operating supplies. Under this policy, no person is permitted to place orders for steel, using the MRO symbol, in excess of the amount, either by weight or dollar value, whichever is preferred, he purchased for MRO purposes during the second quarter of 1944. This action was taken in a series of directions to the following orders: CMP Regulation 5, the general MRO rules; CMP Regulation 5A, containing MRO rules for governments and institutions; Preference Rating Order P-56 covering MRO for mining operations; Order P-141, governing MRO for public sewage and sanitary facilities and Order P-142, governing MRO for transportation systems.

• **DRAFT AND VE-DAY**—The draft will not be stopped if VE-Day comes before June 30 because the War Department wants to give discharge preference to 1,000,000 men who have been in the Army more than four years and to a large number who have been serving for more than five years, manpower officials say. Up until June 30 the 120,000 men a month Selective Service calls will continue to replace discharges. Up to this time, men in the 26-29 age group will continue to be screened carefully through the war agency certification system. After that time, greater liberalization can be expected in deferment rules for men in this age group, it is reported. The interdepartmental committee decision on steel is that the industry may retain up to 80 per cent of its deferred men in the 26-29 age group. Draft calls after June 30 are expected to run between 80,000 and 90,000 with 18 year-old inductions making up about 75,000 of the calls. The remainder will come from the 26-29 group. After June 30, no men 30 years or older may have to be called if present service manpower requirements continue as they are now estimated.

• **ORE INVENTORIES**—Iron ore inventories at furnaces and docks as of the first of April reached the lowest point since 1918, according to the Lake Superior Iron Ore Association. Stocks at U. S. and Canadian furnaces and Lake Erie docks totaled 17,303,561 gross tons on April 1, compared with 24,576,589 gross tons a month ago and 21,332,964 tons on April 1, 1944. This is the lowest ore inventories have been since 1918 when they amounted to some 15,407,000 tons. Prior to the current figures 1937's total of approximately 17,400,000 tons was the second lowest. In 1942 stocks declined to 17,561,000 tons. Consumption of ore by furnaces during March registered a decline from March of last year, amounting to 7,082,076 gross tons against 7,658,847 tons. During February, a 28-day month, consumption totaled 6,370,504 tons. Last week-end marked the changeover from the limited loading of Great Lakes ships at Winter-load-lines to the intermediate line and the start of regular insurance rates, a factor which will bring forth a number of ships from Winter berths. There were 170 U. S. and seven Canadian furnaces in blast April 1, compared with 169 U. S. and seven Canadian furnaces a month ago and 177 U. S. and seven Canadian furnaces a year ago.

• **COLORADO FUEL & IRON CORP.**—In discussing shell steel cutbacks in a recent issue it was stated that Colorado Fuel & Iron had had cancellations on shell steel orders and as a result was soliciting structural business. Later reports indicated that as yet the company has had no shell steel cutbacks and was not soliciting structural business because orders on the books were already heavy enough to carry production far into the future.

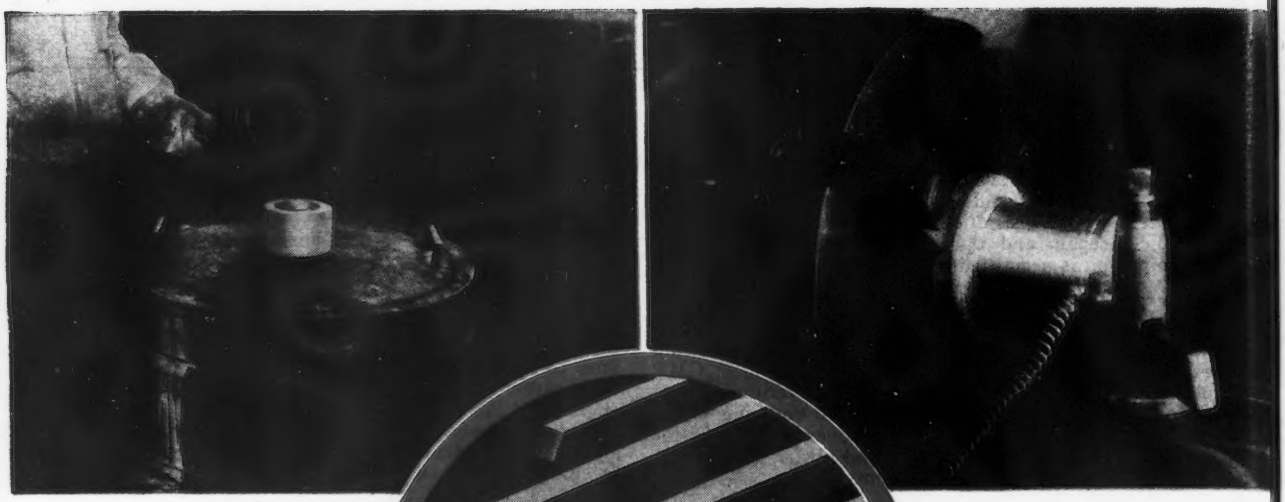
• **CANADIAN AGRICULTURAL STEEL** — With the object of conserving steel and making more supplies available for the war program, announcement was made in Canadian Government circles that until further notice, production of new agricultural equipment and attachments will be at a rate that represents 72.5 per cent of output in the base period. Production of repair parts, however, will continue at 100 per cent. Assuming that this rate were to continue throughout the year starting July 1, 1945, it would mean a total supply for Canada of 172,000 tons, and of this total 124,000 tons would be produced in Canada. As originally planned production for Canada would be 174,000 tons and an available supply for the whole production year of 238,000 tons. It is believed, however, that the present rate may be revived at the end of the European War. Actually the 1944-45 program calls for 100 per cent production for the year, but there is provision inserted in the program which may cut back production by 27.5 per cent.


STEEL INGOT AND PIG IRON PRODUCTION
1930-1940 AVERAGE = 770,962 NET TONS INGOTS PER WEEK
1930-1940 AVERAGE = 2,273,000 NET TONS PIG IRON PER MONTH
WEEKLY STEEL INGOT CAPACITY
STEEL INGOTS
MONTHLY PIG IRON CAPACITY
PIG IRON
INGOTS, MILLION NET TONS
PIG IRON, MILLION NET TONS
1942
1943
1944
1945
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
JAN. FEB. MAR. APR. MAY JUNE
The Iron Age

Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
April 17	86.0*	99.5	93.5	95.5	100.0*	104.5	89.0	49.0*	97.5	100.0	88.5	94.5	105.5	93.5*
April 24	92.0	99.5	95.0	95.5	101.0	106.5	89.0	70.0	97.5	104.0	88.5	94.5	105.5	95.0

* Revised



In the making

Illustrating how ALX Cast Alloy Tool Bits are poured on a centrifugal spinner. The metal is weighed first to assure filling the mold without insufficiency or waste.

On the job

A 7/16" ALX Tool Bit rough-turning a Type 309 (25-12) stainless steel forging of 4-1/4" diameter, taking a 1/8" cut at a speed of 140 feet per minute, with a feed of .020".

Announcing ALX CAST ALLOY TOOL BITS — FAST CUTTING NON FERROUS TOOL BITS CONTAINING BORON

OUR most recent development in the field of cutting materials, ALX Cast Alloy Tool Bits, is the result of complete and thorough research investigation in the Allegheny Ludlum Laboratories, and exhaustive machining tests in the field.

Produced by advanced methods of centrifugal casting, ALX Alloy is a highly homogenous metal, with consequent advantage in cutting properties. It possesses high hardness in the as-cast condition, requiring no further heat treatment. In performance, ALX rates between carbide metal-tipped tools and high speed steel. It rounds out and completes the Allegheny Ludlum line of cutting materials—which includes Carmet carbide metals and a wide selection of high and low-tungsten and "moly" high speed steels—giving us the utmost range in supplying the tools best fitted for each individual job.

Ground and finished ALX Cast Alloy Tools, both in solid and tipped bits, are available in a complete range of sizes from our own and distributors' warehouse stocks. They fully merit serious investigation and comparative testing on your cutting jobs. The assistance of our Mill Service Staff is at your entire disposal ● Also available is a new and complete bulletin on ALX Tool Bits, giving full data on selection and performance. *Write for your copy.*

Address Dept. IA-38

Allegheny Ludlum STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

W & D...979

Many Industry Opinions For Disposal of Government Steel Plants

Washington

• • • **Disposal** of government-owned steel plants may form the pattern for all disposal of government-owned plants in the postwar era.

This conclusion was reached on April 21 by the Senate Military Affairs War Contracts Subcommittee in a report to the Senate, by Sen. Joseph C. O'Mahoney, Democrat of Wyoming, chairman.

The highlight of Senator O'Mahoney's report was his assertion that the immediate offering of government-owned plants, for sale or lease, is an unemployment preventive.

The committee reached this conclusion following receipt of answers to questionnaires sent to the steel and railroad industries, state and federal government officials, union leaders, and western businessmen, by the O'Mahoney Subcommittee.

The questionnaire sought to establish facts about the following steel plant disposal problems: Methods of disposal; whether present operating companies should be preferred or disqualified from purchasing or leasing; whether special concessions to prospective buyers such as credit, tax privileges, favorable freight rates and other special disposal conditions should be granted; the basis for prices and rentals—whether they should be fixed or flexible.

Asked about what economic factors will affect the utilization of the additional steel capacity created during the war, most steel companies anticipated greater postwar than prewar demand.

The Bethlehem Steel Co. doubted whether real progress could be made at this time through examination of economic factors, and felt that no reliable statistics are obtainable on most of the questions, and that any attempt to answer them would be purely guesswork, the report said.

Walter S. Tower, president of the American Iron & Steel Institute estimated that initial postwar steel demand may be between 65,000,000 and 70,000,000 ingot tons, according to the report. Last year's output was about 89,000,000 tons, with a 95,000,000 ton capacity.

The Inland Steel Co., which agreed with Mr. Tower's estimate, said that the average steel demand for the next 30 years would be 54,000,000 ingot tons a year, with a maximum demand of 63,000,000 ingot tons by 1975.

Far western and southern steel demand is expected to increase, and a high demand is counted upon in automotive centers and regions where manufacturers of household utilities are located.

Plant-by-plant studies of new plants in new areas to determine feasibility of postwar operation was advocated by nearly all replies.

Such studies would involve a market analysis for 20 to 25 years to discover what demands will arise during the period for all types of consumer and durable goods for domestic and export trade. Finally such market analysis must include a study of whether the estimated postwar markets can be reached competitively by other steel plants.

The report said an analysis of the existing facilities requires a study of the rate of capacity, the availability of raw materials, and the source and cost of assembly, the suitability of existing facilities, the need for additional capital expenditures necessary to reconvert or to add additional facilities, the probable operating costs of the reconverted plant when running at different operating rates, and anticipated and present freight rates from the plant to markets for each product to each destination.

Replies were unanimous on the point that plants should be disposed of before present use is discontinued to prevent deterioration and added preservation costs to the government.

One of the answers on the other hand, cautions against any disposition which will affect present operations, and some companies doubted that major companies now operating government-owned plants can decide whether they want to continue operations or not after the war. Haste was cautioned against.

Basic disagreement was found between companies on the question of whether plants should be sold or leased, or how else they should be disposed of.

A few replies of various companies follow:

Plants should be disposed of by sale only to get the government out of business.—Inland Steel Co.

Plants should not be sold but leased for 20 years on a tonnage basis to prevent sales at sacrifice prices.—Copperweld Steel Co.

Sales are preferable, but individual conditions should govern the method of disposition.—National Supply Co.

Many companies which want to get additional steel capacity are not sufficiently well entrenched financially to risk an undue portion of their resources in outright purchases, but that leases with options to buy would be preferable.—Atlantic Steel Castings Co.

Purchase of government-owned facilities involves unusual degree of risk upon the part of the purchaser, and the risk is bound to influence the price buyers will be willing to pay. Facilities built to produce war products primarily should be held in stand-by condition, rather than sold at a nominal price, since most of them

OK's DPC Disposition

Washington

• • • **The Senate Military Affairs War Contracts Subcommittee said recently that DPC has been wise in permitting negotiations for the disposition of the $196,000,000 steel plant at Geneva, because of the "tremendous magnitude of framing a policy for its utilization." Also what is done by the government in disposing of this big plant it owns, may be the pattern for disposition of all government-owned plants.**

However, the fact that negotiations have been started by DPC with the Colorado Fuel & Iron Corp., Kaiser, Inc., and the U. S. Steel Corp. is no sign that war work in the plant is drawing to an end, the committee said.

The War Department demand for 30 per cent of Geneva's output which is devoted to shell steel production will continue indefinitely and the demand for plates by the Maritime Commission though dropping as the program is reduced will not cease until fall. Assuming the continuance of the Japanese War, production of steel plate for the Navy is not expected to be reduced during the remainder of the year.

While the Maritime Commission has been getting most of its plate from the Fontana, Calif., plant operated by Kaiser, Inc., the committee said, Maritime has been getting about 5000 tons of plate a month from Geneva during the past year.

are not adaptable to peacetime production.

As for facilities installed at or near existing plants designed to supplement existing facilities in the production of standard steel products, the owners of the existing plants should be given an opportunity to acquire the plants. Should it be impossible to agree on a satisfactory purchase price, it is suggested that a lease with an appropriate rental base might be worked out.—Bethlehem Steel Co.

United Engineering & Foundry Co. was opposed to the sale of steel plants to companies not now engaged in the steel business, as for example, automobile or refrigerator manufacturers, or railroad companies. With this Continental Foundry & Machine Co. agreed. American Radiator Co. took the middle position and felt that steel plants should first be offered to people engaged in the steel business and secondly to people who might want to engage in the steel business.

On the question of relative transportation costs in connection with the assembly and distribution as compared with old established plants, the report says the replies received emphasizes that freight rates unprofitable to railroads are not justified to keep plants in operation, and no rail rates should be made which would discriminate in favor of any such plants.

With respect to new basing points or non-basing point pricing, the answer supplied by the Inland Steel Co. suggests that the Temporary National Economic Committee found ample justification for the continuation of the base point method of pricing. The Inland Steel Co. said that there are no restrictions on the number or locations of basing points and that new basing points may be designated by any steel producer with the announcement of the base price applicable. The company also noted that the basing point system furthers the unusual requirement of the steel producer to keep up high volume, low cost production of steel, and that any change over to a non-basing point method of pricing would create serious dislocation within the industry and the national economy. This view was strongly supported by the National Supply Co.

The Copperweld Steel Co. suggested that rentals should be based on the production and shipment over a 20-year lease period. The Inland Steel Co. points out that in many instances plants have been constructed at an abnormally high cost or have been placed in locations in which competitive disadvantages exist. The company believes that the value of the capital equipment should be considered no greater than its earning capacity, and that in fixing fair value, due recognition must be given this factor.

The majority of the replies replies received to the letter sent to approximately 50 major railroads said that the freight rate structures is highly complex, that they reflect circumstances and conditions economic and otherwise, surrounding the movement of each kind of traffic from each origin to each destination individually, and a general relationship to other origins and destinations, as well as a reasonable relationship to competitive commodities. Consequently, most of the letters suggested that the overall problem of railroad rates is such that the situation can best be dealt with when specific information is available concerning the purposes for which individual plants are to be used, together with information about general areas in which raw materials will originate, and destination territories of the manufactured products.

Restricts Directives On Steel Mill Orders

Washington

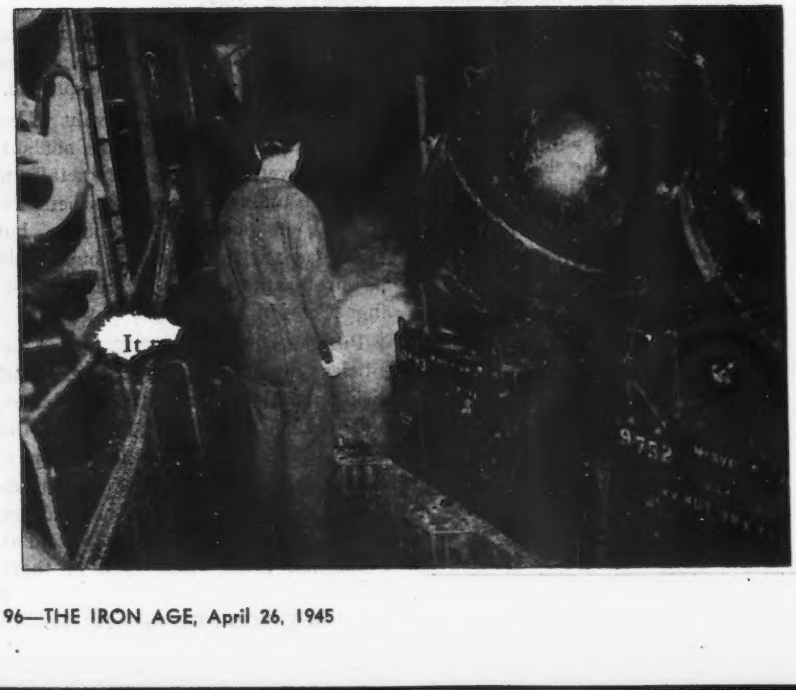
• • • New plans to curb the use of directives on steel mill orders that take precedence over CMP allotments, previously announced by WPB, were discussed at a recent meeting of the WPB Steel Products Advisory Committee, WPB said on April 16.

The plans outlined by WPB officials to the committee included steps to prevent use of directives to advance orders on mill schedules that have been placed for future quarterly periods.

Recent practices by some steel purchasers in accepting advanced delivery dates with the hope of obtaining earlier deliveries through the use of directives have contributed heavily to the recent order pile-up on the mills, steel division spokesmen said.

Directives in the future will be issued only upon certification by a claimant agency that an earlier order delivery is required to meet a genuine emergency, WPB said.

HAZARDOUS MINE LAYING: *Minelayers like this one must work close to the enemy coast, at times under the nose of coastal batteries, when planting mines in enemy waters. Here the doors are open and the lay begins from a British minelayer.*



Republic Net Increases

Cleveland

• • • Republic Steel Corp. recently reported a consolidated net income for the first quarter of 1945 of $3,084,548 after all charges, including estimated federal income and excess profits taxes. A provision for federal income and excess profits taxes of $11,175,000 was made for the quarter. The first quarter earnings compared with $2,216,611 for the first quarter of 1944.

Pre-reconversion Steps Moving Rapidly As Overall Cutbacks Increase

Washington

• • • Pre-reconversion steps moved swiftly last week with government agencies starting to clear plants by instituting partial cutbacks in the auto industry and generally getting the plans made last fall dusted off and ready to get into operation.

Although opinion was divided, the greatest weight was that unofficially the United States started industrial demobilization planned for VE-Day in the week beginning April 16. The VE-Day cutbacks in aircraft in the auto and airplane industries, plus accelerated planning and authorizations for machine tool purchases and construction for reconversion lent credence to this belief.

These steps were:

1. WMC decided to reduce the approximately 70 tight labor areas to 31. Detroit and San Francisco moved out of the tight No. 1 labor areas to II classifications. Generally, Eastern seaboard shipping centers will be moved back one labor classification and the critical areas will be cities where only expansions of programs are cut back.

2. WPB Industry Divisions swiftly re-drew plans for lifting production controls and they are generally in readiness in the hands of the WPB Committee on Period One headed by WPB Executive Officer John Small.

3. Thinking went realistic on cutbacks. High ranking WPB officials say that cutbacks, run-outs in the first three months of the cancellation period will be 25 per cent instead of the original 12 per cent cut in expenditures, announced several weeks ago.

4. Industries with longer lead times for reconversion, about 70 of them, were granted priority ratings for procurement of tools. The Consumer Durable Goods Division of WPB went to work to increase production of components that may be critical for various items of manufacture.

5. WPB officials were skirmishing with the War Department over whether CMP should be "open-ended" as soon as cutbacks make substantial open-spaces on mill schedules. The Army has not yet agreed that CMP should be "open-ended" to permit mills to accept orders above allotments. Material Divisions are trying to figure out what metals and products are likely to be in short supply.

A new estimate of the steel to be made available under the originally announced cutback percentages turned out to be 2,300,000 tons of carbon steel and 470,000 tons of alloy steel. But these figures were due for revision with the increased cutback, perhaps doubled.

Cutback and program expansion plans are competing for products as in the case of the projected step-up in bomb production and the increase in oil country tubular goods for the petroluem industry.

6. The war agencies represented in the Program Readjustment Committee agreed to coordinate announcements of cutbacks regionally with national releases from Washington. The War Department announced that the aircraft cutback is a reduction of about 15 per cent by weight in aircraft schedules and is part of the termination program originally planned for V-E Day.

Confusion on manpower and price policies remained to be straightened out, as neither OPA nor WMC announced post V-E Day programs.

Typical of industries which now find themselves in a quandary because of unexpected material shortages is the auto industry. Last week, manufacturers were told that the textile situation was so bad that every effort would have to be made to get enough material for automobile upholstery and that barring some miracle, stainless steel for bright work could not be had for the first cars. Tire supply was said to be problematical. Lumber supply for bracing and packaging was said to be on the maybe-so list too.

Immediate visions of postwar cars to be featured as the "1945 blackout special" with no bright work, and cars with "bomber-bucket" seats began to haunt manufacturers. Alternate suggestions to solve the nickel shortage which is back of the bright work problem, were that manufacturers could substitute plastics for grills, or perhaps go for a zinc-chrome-silver alloy.

However, WPB Chairman J. A. Krug told THE IRON AGE on April 20 that the auto-makers would get all the textiles, lumber, stainless steel and tires needed to produce 2,000,000 cars in the year after V-E Day. He also said that Detroit war contract cancellations would go as high as 50 per cent in the year after Germany's defeat.

On the subject of machine tools he declared that only six out of 150 tool companies relied upon by the passenger car industry have Russian machine tool orders which are rated AA-1 as compared to the AA-3 rating granted to the car manufacturers.

B-29 ROOST: *Superfortresses of the 21st Bomber Command that have been attacking the Japanese mainland are shown at a Marianas Island base. Tents are for ground crews and repair shops.*

Small Steel Firms Prepare To Call for Price Increases from OPA

Pittsburgh

• • • "Fight fire with fire" seems to be the opinion of some 40 small steel producers who met in Pittsburgh on April 18, to discuss the dilly-dallying of OPA in the matter of raising steel prices which OPA had promised would be done earlier in the year. While OPA has been furnished with all kinds of cost data, its inaction has been of grave concern to the small steel producers. The cost level of at least 70 per cent of the industry's carbon steel products is now above the selling price level, according to the small steel producers group. The result is that many small producers are going to slip to the red side of the ledger during the first two quarters of this year, it is said.

These non-integrated companies are now apparently going to insist that OPA take immediate price action, as it is apparent, according to one steel company official, that the OPA is now in violation of the emergency price control act in so far as the steel industry is concerned.

These 40 steel producers, as individual companies, are going to attempt to place political pressure on the OPA in order to get price adjustments necessary to make steel manufacture profitable. The group indicated that a resolution was adopted authorizing representatives to request OPA to grant immediate, equitable, and adequate price adjustments in order to prevent serious financial losses to the companies and their more than 100,000 employees.

However, the effort is going to be greater than just asking OPA for price relief, it was indicated. A series of meetings of committees from the organization will be held in the eight states represented by the manufacturers. These groups, it is said, are going to put the matter up to the individual state governors, congressmen and senators, pointing out how disastrously near financial bankruptcy the inaction of OPA has forced these steel companies. Through these offices, it is apparent that an immediate attempt will be made to apply political pressure on OPA. Furthermore, it is believed that an ex-congressman, Cal Johnson of Illinois, will head up the group in Washington in order that the dispersed attempts of the various companies can be organized and the full effects of their efforts be focused on the resistance to price increases in steel.

Steel industry costs have increased and only by virtue of full scale operations, confirmed going prices, and higher than normal percentages of larger profit items because of war conditions have steel companies been able to maintain even the present level of earnings, according to industry opinion. Earnings have been steadily declining since the beginning of the war, it was pointed out, and are now at a point where many companies are facing eventual disaster.

Western Pipe & Steel Operating Income Up

San Francisco

• • • Western Pipe & Steel Co. of California reports operating income for 1944 of $7,455,319. After providing dividends on preferred stock, the net profit was equal to approximately $8.65 per share on the outstanding common stock. This compares with $7.05 on common for 1943.

Chairman H. G. Tallerday reports that the San Pedro shipbuilding division continued production of Navy and Coast Guard craft and the San Francisco shipbuilding facilities produced C-3 type vessels for the Maritime Commission. Construction at San Pedro will continue at substantial volume into 1946 whereas the San Francisco yards are now engaged in ship repair work for the Navy and War Shipping Administration. Six fabricating plants have operated at full volume on war work and shipbuilding sub-assembly and extensive surveys are being conducted to develop new product lines and resume the normal operations of the company in general fabrications, particularly concentrating on welded pipe and tank structures.

Canadian Vessels Ordered

Toronto

• • • The Department of Munitions and Supply announced that contracts have been placed with Canadian firms for 7 steel fire tugs, 60 ft. in length to cost $554,118; and one whaler for the Royal Canadian Navy. Orders also have been placed for 21 storing tenders, 41 ft. in length and valued at $25,235 each for the British Ministry of War. In addition the department is ordering 15 65-ft. wooden diesel tugs; 35 60-ft. steel diesel tugs; 12 storing tenders and 22 drop keel dinghies.

AUTOMOTIVE CONVEYORS USED: *When Fisher Body Division of General Motors received a rush order for a new type of rocket fin, it called into use monorail conveyors of a sort used infrequently since automobile production was suspended. Tooling on the job was completed within a month at the Fisher Pontiac plant. Above is a mass production painting operation, utilizing dipping and auto body drying ovens.*

Hollinger Finds Large Reserves Of High Grade Iron Ore in Labrador

Quebec

• • • **Development of what may be the most important commercial iron ore discovery since the finding of the Lake Superior deposits, has been described to the annual meeting of the Canadian Institute of Mining & Metallurgy by Dr. J. A. Retty, chief geologist of Labrador Mining & Exploration Co., Ltd. The Sawyer Lake deposit in central Labrador has been probed by diamond drilling in exploratory holes to a depth of 220 ft., with the drills still in ore. Analyses of core samples yielded an average of 68.4 per cent iron with phosphorus, sulphur and silica contents very low. Open at both ends, the tonnage of this high grade, lump quality, premium ore is indicated by the work done to date to yield a minimum of 30,000 tons of ore per vertical foot or an indicated minimum tonnage of approximately 6 million tons.**

The development of the concessions held by the Labrador company is under the direction and control of Hollinger Consolidated Gold Mines, Ltd. Under an agreement with the Newfoundland Commission of Government, the company holds an area of approximately 20,000 sq. miles, which comprises the western portion of Newfoundland-Labrador and includes the upper basins of the Hamilton and Naskaupi rivers.

Nine deposits of iron ore and three outcrops have been discovered in the Newfoundland-controlled area. Some are as long as 3300 ft. and the widths are generally appreciable. The average grade of the ore is 63.2 per cent combined iron and manganese. Much is of lump character and all deposits except one are of Bessemer quality.

Another subsidiary of Hollinger, the Hollinger North Shore Exploration Co., Ltd., has licensed from the Province of Quebec an area of approximately 3900 sq. miles, lying directly north of the Newfoundland-controlled area at the headwaters of the George, Whale and Swampy Bay rivers.

With the exception of the years 1940 and 1941, field work has been conducted in the Newfoundland area since 1936, and in the Quebec area since 1939. Hollinger assumed the management in 1942. The field base is located at Hollinger Lake, some 300 miles north of the tide water base at Seven Islands, Quebec, and air transportation is used exclusively to service the operation.

So far as is known, the rocks of the region are of Pre-Cambrian age. There is a series of ancient gneisses intruded by anorthosite, anorthositic gabbro and granite. This series is of the Grenville type and may be the equivalent of the Grenville Series of other parts of the Canadian Shield. Resting unconformably on the ancient gneisses is a series of relatively unaltered sediments and volcanics which contains at least two bands of iron formation. This belt of rocks is 40 to 50 miles wide and at least 350 miles long. It is intruded by gabbro, diabase, diorite, feldspar porphyries and granite. This rock assemblage bears a striking resemblance to the iron-bearing series of Huronian age occurring in the Lake Superior region.

To the east of this presumably Huronian series, there is a belt of predominantly volcanic rocks some 20 miles wide which has been traced for a distance of 75 miles. They are invaded by serpentinite, diorites and acidic intrusives. The age of this belt is not definitely known. They greatly resemble the rocks of Keewatin age of other parts of the continent but they may quite conceivably be younger.

In addition to the above, a tremendous deposit of siliceous iron ore has been discovered at Lake Attikamagen. The reserves indicated are measured in millions of tons with iron grading 39 per cent and silica 27 per cent.

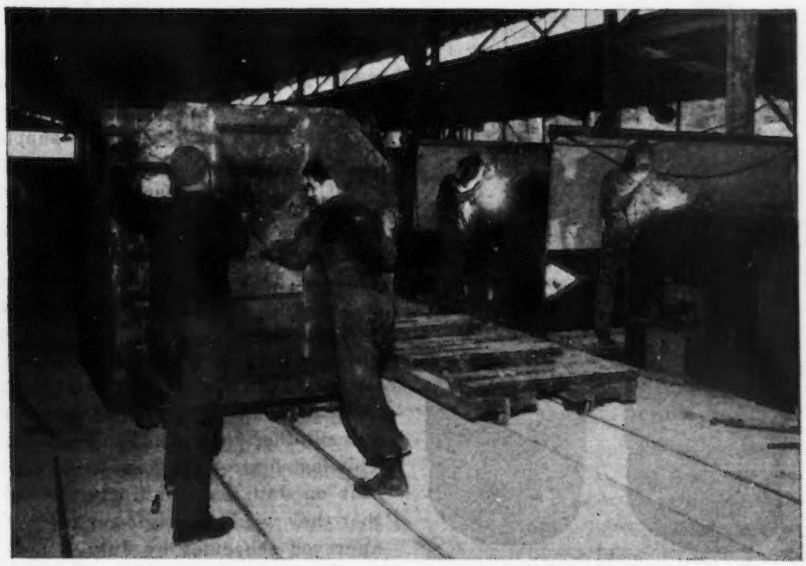
In the New Quebec area, 15 deposits of iron ore have been discovered, one of which is 3900 ft. long and appreciable widths are also indicated. The average grade of the ore is 62 per cent combined iron and manganese and all except one are of Bessemer quality.

Apart from mapping and sampling, no surface work has been done on any of these deposits except at Sawyer Lake. Continuity of length and width is indicated by intermittent outcrops. The possibilities of increase both in width and length are obviously very great.

The geology of the eastern part of both the Newfoundland-controlled and New Quebec areas is also favorable to the occurrence of base metals. At present, the discovery appearing to have the most merit is located at Frederickson Lake in New Quebec. Only a small amount of preliminary work has been done at this location. The showing consists of zinc-copper-lead material, with some values in precious metals, having an average width of 13 ft. and traced along a length of 660 ft. The grade in per cents is 6.75 zinc, 1.32 copper, 0.7 lead and slightly over $2 in gold and silver.

There is ample water-power in the area to meet the requirements of any large mining operation, as Grand Falls, one of the largest undeveloped sites in the world, lies within the Newfoundland-controlled area. A recent power survey of the falls indi-

PONTOON ASSEMBLY LINE: ***To take care of accelerated amphibious warfare in the South Pacific, U. S. Navy Seabees set up an assembly line, which is now in its second year of production. Here two Seabees are moving a section pontoon in the storage yard.***



cates that the minimum hydro-electric energy available is 1,250,000 hp. This site lies approximately 90 miles southeast of the Sawyer Lake deposit and 140 miles southeast of the main area of deposits.

The transportation problem is not particularly difficult as a railroad could easily be constructed along the Romaine River Valley from the Gulf of St. Lawrence to the area. There is a shorter route to the deposits from Hamilton Inlet but the route to the St. Lawrence is favored because of the possibility of year-round shipping. There are excellent harbors at all possible termini of a railroad.

U. S. Steel President Sees Postwar Rise In Production of Steel

Birmingham

• • • **Benjamin F. Fairless**, president of the U. S. Steel Corp., said here recently that he was optimistic over postwar prospects and declared properties in Birmingham would be expanded to meet what he expects to be an increasing demand for steel in the Southeast.

The U. S. Steel president saw an increased per capita demand for steel in the postwar period, asserting that it may find many additional uses in housing. He does not expect a sudden shift to all steel houses but said he did envision an increase in steel in home construction.

Mr. Fairless said he would make no prediction as to how long it would take the automobile industry to reconvert, but that it would depend on how much of an automobile plant remained in war production.

"It is foolish to believe, though," he said, "that the conversion from 100 per cent war production to 100 per cent peace production could be accomplished overnight. Even six months in reconversion, I admit, would seem like a long time to anyone out of work."

The rate of steel production after the war, he said, will of course be governed by how the other plants that use steel can change over.

Mr. Fairless, during a tour of properties of the corporation's subsidiary, the Tennessee Coal, Iron & Railroad Co., presented to Herbert Tutwiler, chief of the Birmingham Ordnance District, the five millionth 155-mm. shell forging produced at the Tennessee company's shell plant at Ensley Steel Works.

Carboloy Inaugurates Training Program On Carbide Shell Tools

Detroit

• • • **In line with the need for tremendous acceleration in shell production, calling for a corresponding increase in utilization of carbide tools, Carboloy Co., Inc., has developed an up-to-the-minute training program specifically designed to enable shell manufacturers to obtain better overall performance and increased service life from carbide tools. The program, undertaken by Carboloy as a non-profit activity, is designed to assist in keeping consumption of critical carbide shell machining tools at levels corresponding to the available output rate for such tools by the carbide industry when the scores of new shell plants are in full production.**

Meeting of shell producers and subcontractors at various key points throughout the country are being held by Army Ordnance at which the new training program will be discussed. Distribution of the course will be through the company's district offices. Carboloy field engineers and district managers in these offices are available to help individual shell plants put the course into operation.

The complete course is designed to serve two definite purposes. In new shell plants it will provide basic training in the use of carbide tools in general, and will also give specific instructions in the use of carbide tools for shell machining operations. In shell plants where carbide tools have been in use for some time, the training course will serve as a refresher and will also furnish new information on improved practices in machining which have been developed as a result of experiences in various shell plants.

TUNGSTEN CARBIDE SHOT: *Pictured at the right is the tungsten carbide armor piercing core revealed recently* (THE IRON AGE, *April 12, p. 146) as being made by the Carboloy Co., Inc., for anti-tank projectiles. View at left shows the aluminum windshield placed over the hard, tough core, which differs from cutting tool material in that nickel is used as a binder instead of scarcer cobalt. The projectile illustrated is for a 76 mm. gun.*

WPB Cuts Allocation For Farm Machinery In Second Quarter

Washington

• • • **To be absorbed in the production of new equipment, with no change in the quantity for repairs, WPB has cut the second quarter allocation of controlled materials, for the manufacture of farm machinery, to 195,000 tons as against a net usage of 256,000 tons in the first quarter of the current year, and 279,000 tons in the sesond quarter of last year. The cut was announced by WPB officials at a recent meeting of the Farm Machinery and Equipment Industry Advisory Committee.**

The full year's allotment, it was stated, will be based upon that of the second quarter, unless the present accelerated demands of the military for steel, due to the pace in Europe, are reduced. The committee was assured that an increase in their allotments could be expected after VE-Day. It was pointed out that it is expected that there will be no reductions in quotas, the reduced production being controlled entirely through allotments of material. This, is was explained, is to permit the acceleration of the farm machinery program upon the ending of the war in Europe. Inventories on hand may be used to supplement the new allotments, it was explained, and should partially offset the effect of the reduction.

WPB officials said that on the first of March production against manufacturers' schedules showed a slippage of 12.2 per cent as against 13.6 per cent on Jan. 1. Wheeled tractors were 3 per cent behind schedule; repair parts, 9 per cent; attachments, 4.4 per cent, and all other equipment, 20.4 per cent. This last figure compares with 23 per cent on Jan. 1. Manufacturers said that they would nearly complete their approved schedules by July 1.

Selective Service Act Needs Revision Regarding Seniority

New York

• • • **Both labor and management at the local personnel conference of the American Management Association, held here recently, pleaded for further clarification and possibly an amendment to the Selective Service Act on the seniority rights in re-employing servicemen.**

The Selective Service Memorandum 190-A, which establishes super-seniority for discharged veterans, was the chief butt of both segments of industry. This interpretative memoranda also provides for the reinstatement of servicemen in their customary type of work as long as that type of work continued with the original employer, even though their reinstatement would entail the discharge of another employee of longer service or job experience.

D. M. Mason of Armstrong Cork Co. emphasized that the legislation speaks of seniority as attaching to an individual a job right, whereas industry recognizes seniority as a relative job claim.

Unions consider 190-A only as an advisory order, he said, but since employers in devising veteran policy must pay heed to the legal obligation upon them for veteran re-employment, they find themselves placed "in the middle." Mr. Mason added, "the employer's only exit is to the courts for a test of Selective Service interpretations. But in such event it is the employer who is the defendant and whether the court case is won or lost, the battle of publicity is surely lost."

In recognition of this situation, he advised employers to set up veteran re-employment policies that are generally acceptable to unions now and that include procedures by which exceptions to these policies can be made when Selective Service contends that any particular veteran's rights extend beyond those conferred by policies.

Ted F. Silvey, chairman of the CIO Reconversion Committee, declared in a paper read for him by D. F. Brown, chairman of the session, that under provisions of 190-A war workers will lose their job security and will be displaced to make room for veterans of this war, while employers will be faced with impossible administrative problems.

Mr. Silvey recommended reinstatement on a basis of accrued seniority including both time spent in military service and previous employment, contending that "Congress intended reinstatement on that basis."

Howard M. Dirks, director of industrial relations, Perfect Circle Co., Hagerstown, Ind., urged industry to press for a clearer, more practical interpretation of the law, or possibly for an amended law to insure uniformity and fairness of treatment to veterans as well as civilian workers.

Continental Engine Has 12 Cylinders; Individually Cast

Detroit

• • • **Announcement of a new 2100-hp. aircraft engine weighing only 1640 lb. was announced by the Continental Aviation & Engineering Corp., subsidiary of Continental Motors Corp. The unit, known as the I-1430, a 12-cylinder 60-deg. inverted V type, is in limited production now.**

The most interesting development feature in the new "Skypower" engine is the fact that its cylinders are cast individually instead of en bloc. Disadvantages inherent in the usual design are thereby avoided, it was said by Continental officials, reducing stresses and strains at maximum load, and at the same time refinements are made possible in the barrel and jacket which result in better cooling characteristics. Service and repair are obviously facilitated. Another innovation in the engine is the fact that the cylinders have two valves each instead of the four customary on engines of this general type.

The engine is built for use with a turbo supercharger. Valve timing and other factors are said to be such that it can use high back pressure to obtain not only sea level power output at high altitudes, but useful ground-boost as well. For dual installation it can be made to run in either direction with the change of a single part.

Engineering interest in the new Continental development, which has been in experimental work for upwards of twelve years, was whetted by the individual cylinder feature. It was obvious that simply by extension of the crankshaft and addition of more cylinders, the engine could probably be made more powerful at every step. Considerable flexibility in size and power output was thereby seen, giving rise to speculation as to widespread uses to which the new power plant might be put.

Cleveland Becoming Critical Labor Area, Needing 4000 Men

Cleveland

• • • **When the Willow Run plant closes, Cleveland will become the prime critical labor area in the country, according to local officials of the War Production Board and the War Manpower Commission.**

At present, Cleveland industry is asking for more than 4000 additional men to work on war contracts and for about 1500 women for office jobs. In the area, four companies, the Industrial Rayon Corp., in Painesville, Electro-Metallurgical Co., and Lake City Malleable Co. in Ashtabula, and National Malleable & Steel Castings Co. here, were recently given permission to recruit workers in Texas, South Carolina and other places outside Ohio.

If some change in this situation does not occur shortly, two other companies may get permission to do the same thing. Industrial Rayon may ask for permission to do outside recruiting for its Cleveland plant and Fisher Aircraft, currently needing some 1000 additional workers, may ask to recruit people for work at plant 2.

About 800 Jamaicans are now working in the Cleveland area and have been of some help in easing the manpower situation. Manufacturers of secret projects and milk processes hold the top priority for manpower at the U. S. Employment Service, and high priorities are also held by employers making steel, truck parts, aircraft ammunition, radar and petroleum.

At the same time, despite the midnight curfew on drinking and amusement establishments, the absentee rate in war plants here was slightly higher during March than it was in February, according to statistics released recently by the Associated Industries of Cleveland.

Covering factories employing 79,669 workers, the organization survey placed the March absentee rate at 5.493 per cent, while the February figure was 5.239 per cent. The average schedule in those plants called for 27.3 days of work last month, but 119,786 man-days were lost by absences from the job.

Absenteeism among women war workers was higher than that among men, since few of the latter (presumably) have domestic duties to perform.

Packard Decision Shows Vote Losses By Foremen's Union

Detroit

• • • **The organizing efforts** of the Foremen's Association of America, independent union, were weakened recently even though the first test of a bargaining election brought victory to the F.A.A. at Packard.

The union obtained 666 votes among the Packard supervisors, against 435 "no" tallies. There were 155 challenged votes out of 1315 eligible, leaving 59 who did not vote.

The reason for management optimism lay, not in the Packard men's espousal of the union, which had been generally expected, but in the fact that the victory margin was so greatly reduced from that prevailing two years ago. In an election held during March 1943, among 693 eligible, the F.A.A. obtained 486 votes, while only two were cast against the union. A total of 130 were challenged and 13 were void, leaving 62 eligible who did not vote.

Inasmuch as the foreman's union was so firmly entrenched at Packard, management opinion in Detroit generally was that the current 3-to-2 margin obtained by the union was indication that the vote might go the other way in plants where more even distribution of thinking appeared to prevail.

Credit was given Packard President George T. Christopher for a series of letters which were believed to have had considerable to do with the swinging of the vote. Mr. Christopher mailed out four letters to all the supervisors in the plant, describing in definitely restrained language the history of efforts to organize foremen at Packard, the provisions Packard has attempted to make for foremen pay, backing in case of disputes with rank and file workers, seniority and security.

Another factor in the unexpectedly strong anti-union showing appeared to be the eligibility of supervisors in office departments and special assignment men to vote in the election. (Special assignment men are traveling representatives of the factory who check and have some degree of supervision over operations performed by sub-contractors.) These groups, particularly the white-collar supervisors, were felt to be more opposed to unionism than the men working on the factory floors.

NTDMA Reaches 300 Members

New York

• • • **Last September,** at the start of the National Tool & Die Manufacturers Association's second year, the board of directors set as its goal for 1945 a membership of 300 tool and die shops. On April 11, the 300th member shop was enrolled in NTDMA. This event took place at a dinner and open forum of the New York Tool and Die Institute, attended by 125 tool and die shop executives from New York and New Jersey, held in New York.

The new goal of 350 members set by National President Richard F. Moore in his address was well on the way toward fulfillment when six additional shops in New York and New Jersey submitted their applications before the evening ended.

The 300th member was the Standard Tool & Mfg. Co., of Arlington, N. J.

Strip Mining Laws Considered in Ohio

Columbus, Ohio

• • • **Although five bills** are pending in the Ohio legislature to regulate strip mining, and while committees of both the house and senate have made extensive studies of the strip mining situation, it appears unlikely that regulatory legislation will be passed at this session of the general assembly.

It is expected that a commission will be named instead to continue studies of the problem and to make recommendations to the next legislature. Bills now before the legislature would require the strip mine operators to restore the land to some semblance of its original contours after they have removed the coal.

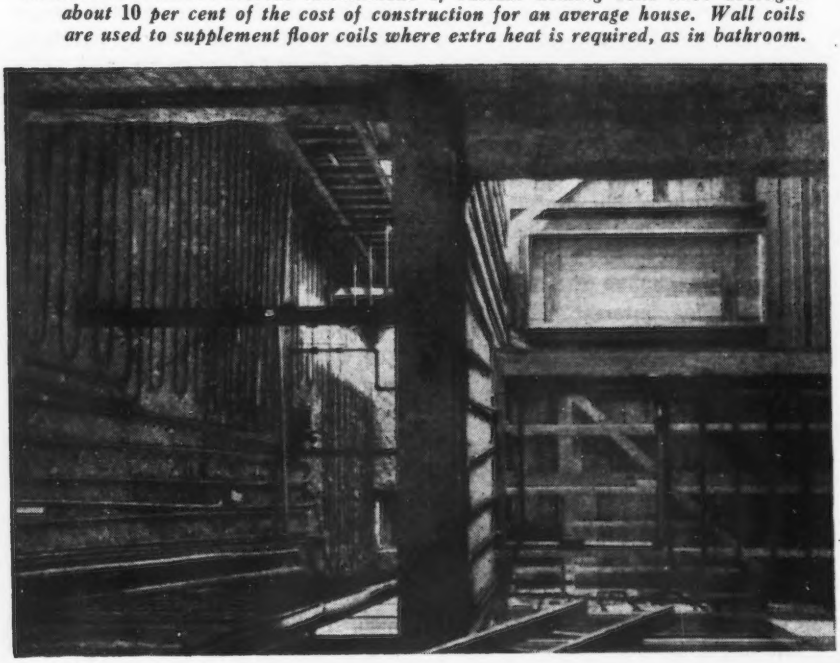
Four of them would compel the operators to post bond guaranteeing a leveling of the land and seeding of the mined area. The fifth would impose a severance tax of 6c. a ton on all coal mined by the stripping process with 5c. refundable when the restoration of the land is completed. The other 1c. would be retained.

Waterways Get 5500 Tons

Washington

• • • **WPB has allocated** 5500 tons of carbon steel for waterways transportation purposes in addition to 14,077 previously assigned for the second quarter of 1945. In making this announcement ODT said that the steel is to be used in building barges and towboats for private carrier use on the inland waterways. Lawrence C. Turner, director of ODT's Waterways Transportation Department, said that the new allotment was made on the condition that the orders be placed with mills equipped to make carbon steel plates.

RADIANT HEAT: *Recent installations of radiant heating coils have averaged about* 10 *per cent of the cost of construction for an average house. Wall coils are used to supplement floor coils where extra heat is required, as in bathroom.*



Strikers Drifting Back to Coal Mines

Birmingham

• • • The number of idle coal miners in Alabama decreased substantially at the beginning of the week, and with War Labor Board approval of the new coal contract an end to the three weeks' strike in Alabama appeared imminent.

Already lost to the war effort, however, were 39,400 tons of steel ingots and 58,400 tons of pig iron with still more to be lost before eight shutdown blast furnaces and seven open hearths in the state could be restored to production.

The Tennessee Coal, Iron & Railroad Co. with partial crews reporting at four of its five coal mines Monday —the first to report at a Tennessee company mine in three weeks—moved to increase its drastically reduced pig iron output, resumed open hearth operations at Ensley Steel Works and reopened closed mills. These included the plate mill and structural mill at Fairfield Steel Works and the rail mill and finishing mill at Ensley.

With steel rate at 49 per cent for the preceding week, a climb to 70 per cent for the current week was anticipated should the miners continue the return to work trend which followed appeals made by union leaders, newspaper editorials and Solid Fuels Administrator Harold L. Ickes.

Analyze War Contracts, Facilities in 4 States

Cleveland

• • • Prime contract and facility awards in this four-state region, covering Ohio, Kentucky, West Virginia, and western Pennsylvania, have amounted to $22,860,364,000 since the beginning of the war, the War Production Board has announced.

By industrial areas, the distribution of the major war supply contracts and facility projects has been:

Akron, $2,038,008,000; Canton, $464,427,000; Charleston, W. Va., $285,067,000; Cincinnati, $2,455,927,000; Cleveland, $4,925,680,000; Columbus, $1,010,102,000; Cumberland, Md., $140,135,000; Dayton, $1,659,641,000; Erie, $429,620,000; Lima, $350,453,000; Louisville, $1,370,691,000; Mansfield, $177,585,000; Marion, $221,351,000; Pittsburgh, $2,695,461,000; Wheeling, $426,295,000; Youngstown, $1,143,517,000; and the remainder of the region, $3,066,404,000.

May Compute Ceilings

Washington

• • • OPA on April 23 announced a formula for computing maximum prices for open hearth or blast furnace grades of steel scrap containing 5 per cent or more copper. The formula may be used beginning April 26 and after that date sellers of such scrap may compute their own maximum prices instead of writing to OPA for approval of a special price for the metal.

Under the formula, the maximum price for any open hearth or blast furnace grade of steel containing 5 per cent or more copper shall be the value of the contained copper at 9.75c. per pound plus the maximum shipping point price of the grade of steel scrap for the actual quantity of steel in each gross ton. The formula may be used in pricing copper bearing scrap of open hearth and blast furnace grades only.

No additions to the maximum steel scrap price may be made for a copper content of less than 5 per cent. A limited tonnage of copper clad or gilding metal clad steel scrap is beginning to appear in scrap metal markets as a result of the ammunition shell program and this material bears five to 20 per cent copper, OPA said. The formula will facilitate pricing of this type of scrap.

Basing Point Order On Glucose Only

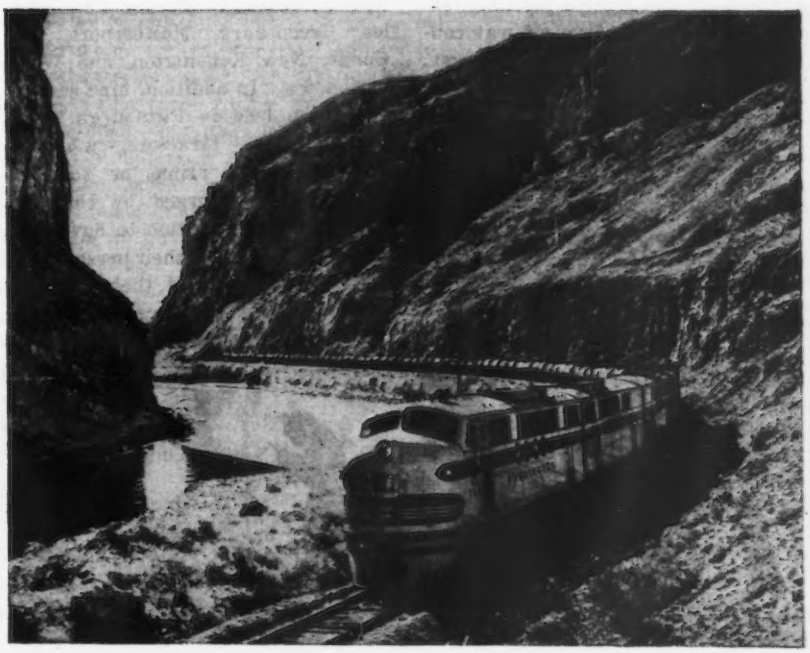
Washington

• • • The multiple basing point pricing system, such as that used by the iron and steel industry, was not affected by the two Supreme Court decisions of April 23. These decisions related only to the single basing point system and were directed against the Corn Products Refining Co. and the Staley Mfg. Co., which use the single basing point system in marketing glucose. Upholding orders of the Federal Trade Commission, the Supreme Court held that this system of pricing is a violation of the Clayton Act.

The opinions, delivered by Chief Justice Stone, clearly stated that it was not passing on the legality of the multiple basing point system. Instead it pointed out that Congress had rejected a proposed provision of the Robinson-Patman Act which would have prohibited such a system.

"We think," said the court in the Corn Products Refining case, "This legislative history indicates only that Congress was unwilling to require f.o.b. factory pricing, and thus to make all uniform delivered price systems and all basing point systems illegal per se."

POWERHOUSE LOCOMOTIVE: *One of the 5400 hp. diesel freight locomotives of the Burlington lines, is shown hauling petroleum cars through Sheep Canyon, Wyo. These diesel freights can haul as many as 100 loaded freight cars, plus 20 to 30 empties.*



Contract Termination Committee Coordinates Plant Reconversion

Pittsburgh

• • • **A Termination Coordination** Committee, composed of representatives of the various governmental procurement agencies concerned with the termination of war contracts and the disposal of property, has been established for the Pittsburgh area. Similar committees have been established in 21 other industrial areas throughout the United States.

In Pittsburgh, Col. Robert C. Downie, district chief, Pittsburgh Ordnance District, is chairman of the committee; Lt. Col. Ralph L. Dunckel, vice-chairman; and John T. Conner, secretary. The Pittsburgh area includes all of western Pennsylvania, West Virginia and parts of Ohio and Maryland.

The Termination Coordination Committee is composed of representatives from the Army Service Forces, including the Corps of Engineers, Chemical Warfare Service, the Transportation Corps, the Signal Corps and the Ordnance Department; the Army Air Forces; the Navy Department, including the Inspector of Naval Material, the Cost Inspection Service, the Material Redistribution and Disposal Office and the Industry Cooperation Division; the Reconstruction Finance Corp.; the War Production Board; the Smaller War Plants Corp.; and the Defense Plant Corp.

The committee will coordinate the activities of the various agencies engaged in the termination of war contracts and the disposal of property, so that all agencies will follow the same general policies in their dealings with contractors. Likewise, it is the purpose of the committee to standardize the operating procedures among the various governmental agencies, and to apply uniform interpretations in connection with the submission of claims and the disposal of property. The committee will endeavor to act as a clearing house for contractors on their termination problems. Advice and guidance will be given to contractors to assist them in dealing with the various procurement agencies.

Several sub-committees have been appointed under the main committee: the Pre-planning and Training Sub-Committee; the Consolidated Program Sub-Committee; and the Property Disposal Sub-Committee. There also exists in this area an Audit Coordination Committee. This committee is in charge of the formation of procedures and the interchange of information pertaining to the audit and verification of claims.

The Pre-planning and Training Sub-Committee is presently conducting a termination course for war contractors throughout the area. The course, a four-hour session, includes the basic principles of claim proposals and property disposition. Presentation of material is on a practical basis, with contractors' representatives being asked to participate in the preparation of actual case studies. The standard forms prescribed for use by the Office of Contract Settlement are studied in detail.

Termination courses have already been presented in Beaver Falls, Butler, Greensburg, McKeesport, New Castle, New Kensington, and Washington, Pa. In addition, nine sessions have been held in Pittsburgh. Contractors, whether prime or sub, are urged by the committee to have some of their personnel attend these sessions. Information concerning the course may be obtained from any agency represented on the committee.

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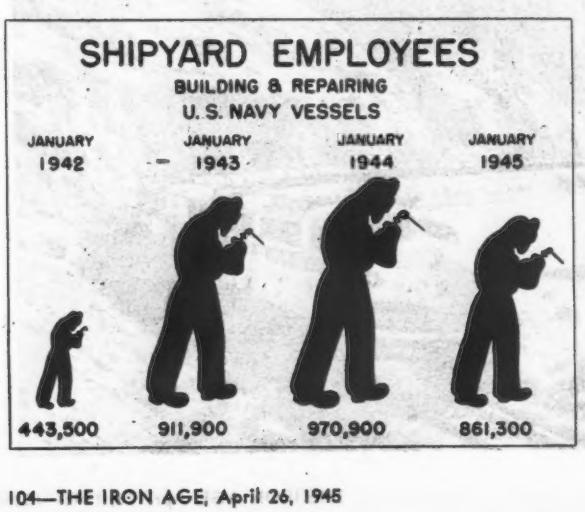

Report Shows Industry Plans to Manufacture New Postwar Products

Dayton, Ohio

• • • **New products will be made by** 63 per cent of 250 industries here after the war, according to report issued recently by the fact-finding group of the Dayton District Development Committee.

This announcement follows the analysis of questionnaires sent the 250 firms by the committee. The questionnaire was designed to obtain general information about plans for Dayton industry, according to Prof. E. B. O'Leary, committee chairman. The analysis showed that 158, or 63 per cent, expect to make some or all new products in the future: 52 per cent are planning on some new products and 11 per cent on all new products.

Of the 11 per cent, nearly all are companies employing less than 100 workers each. Indicative of the industrial trend is the fact that less than one-third of the 250 plants polled do not expect to embark on new products and only five per cent have indefinite plans.

Just what the new products will be was not announced, since the questionnaire did not seek such information. Adequate working capital will be available to meet the postwar requirement of Dayton industries.

A financial survey made last year by the Dayton Clearing House Association under the sponsorship of DDDC showed that 58 per cent of the working firms in Dayton have adequate working capital; 30 per cent evidenced additional working capital requirements of approximately $3,000,000; while the remaining 12 per cent were indefinite regarding requirements.

Armor Order Altered

Washington

• • • **The provision of** CMP Regulation No. 10, requiring approval of certain orders for Class A products before they may be placed, does not apply to purchase orders for rolled or forged steel armor plate, regardless of the particular form or shape, the WPB has announced. This change, contained in Direction No. 1 to CMP Regulation No. 10, is made to expedite the procurement program for this type of material, WPB officials said.

M-263 Amended by WPB To Speed Delivery Of Unfilled War Orders

Washington

• • • **Designed to speed up** delivery of the more essential unfilled rated orders for certain types of equipment, WPB has amended General Industrial Division Table 6, Order M-293. Under the amendment, Subdivisions 13 and 14 of the table are combined, and added to the new Subdivision 13 are types of woodworking machinery, the demand for which, according to WPB, has so far exceeded supply that scheduling is deemed advisable.

The additions are nailing machines, wood box printers, planers, surfacers and double surfacers. WPB said that machines of this type are currently in great demand for the preparation of wood boxing and crating, largely for packing military supplies. The number of manufacturers is small and their backlog of unfilled orders was said to usually extend for months. Further additions to Table 6 are:

1. Subdivision 14 covers resistance welding equipment. WPB said that the demand for this item is also critical, largely because of new military programs. Manufacturers have average backlogs of six or seven months. A substantial portion of the high rated orders on their books are for maintenance, repair and operating supplies.

2. Subdivision 15 covers wire working machinery. The need for additional facilities for making field and assault wire, for electric motors, fuse springs and heavy ammunition, WPB explained, is critical and the present demand exceeds supply. The number of manufacturers is limited, and backlogs are around five months.

Smoke Pipe Needs Outlined

Washington

• • • **Allotment of 60,000** tons of carbon steel for the second half of 1945 was recommended by the task committee of the Stove and Furnace Smoke Pipe Advisory Committee at a meeting recently at which it was stated that an estimated 100,000 tons of stove and furnace smoke pipe will be needed in 1945 to meet minimum essential requirements. Committee members said if any steel is available in addition to the tonnage recommended for the second half, the industry will be able to use up to 50,000 tons per quarter with little, if any, increase in manpower.

The task committee was appointed at the March meeting to study the effect on the industry, of reduced steel allotments and to gather information on inventories and the ability of the industry to meet essential requirements in the second half of the year.

Packers Allowed to Carry Steel Over Into Next Quarter

Washington

• • • **The Steel Shipping** Container Industry Advisory Committee was told by WPB officials at a meeting recently that packers are permitted to carry over into the second quarter any used portion of their first quarter quota of new steel shipping drums. Packers' quotas of drums during the second quarter also are provided in an amendment to L-197, issued March 31.

Industry members stated that the situation concerning the supply of box cars for shipping steel containers is still serious, although it has shown some improvement in recent weeks. Shortages of box cars, they said, have compelled some metal container manufacturers to slow down production. Some committee members reported difficulty in getting cars suitable for transporting metal barrels. The availability of steel was declared to be the limiting factor in the steel drum and pail production program.

Spot Authorization Materials Orders Changed

Washington

• • • **WPB has called** special attention to the fact that Priorities Regulation 25, as amended Feb. 21, provides that no other ratings or allotment symbols may be used to get production materials for a spot authorization schedule than the ones assigned to it, unless a rating or symbol is specifically assigned by WPB for a particular material or product to be used in the schedule.

Furthermore, WPB officials said, this provision prohibits the use of the small order (SO) allotment symbol in obtaining materials for use on a spot authorization. Similarly, it was said, manufacturers of Class A products who receive orders identified by the Z-1 allotment symbol used in connection with spot authorizations may not treat them as small orders under the provisions of CMP Regulation 1, unless their customers make allotments to cover such orders.

Surplus Property Standards Books Are Now Complete

Washington

• • • **The eighth and last** pamphlet of the Handbook of Standards for describing surplus property has been issued by the Surplus Property Board, and is available at the office of the Superintendent of Documents, Government Printing Office, at 15c. The final pamphlet consists of Sections XVI through XXI.

It covers the following classes of property: Section XVI — furniture (except office furniture) and fixtures; Section XVIII—photographic and optical goods and equipment; Section XIX—instruments and control apparatus, including scientific and professional apparatus and supplies; Section XX—armament and ordnance equipment and material; Section XXI —plastics, metal containers, hand tools, metal end products and miscellaneous products and equipment.

It was emphasized that this publication is not a list of surplus property that is available for sale. It is confined to the establishing of minimum standards to be used by contractors and government owning agencies in describing inventories. These standards are designed to furnish sufficient information in commercial terms to allow a surplus property disposal agency to arrange for resale without calling upon the owning agencies for additional items of description.

New Lead Battery Regulations

Washington

• • • **WPB has amended** L-180 to prevent lower standards of quality in the replacement of storage batteries by reason of the prevailing lead shortage. Further changes are designed to prevent any increase in the production rate of 80-ampere-hour batteries and to prevent the sale of all batteries except under conditions in which replacement is imperative. During the second quarter producers are required to fill all orders for replacement batteries for medium and heavy trucks, truck tractors, truck trailers, passenger carriers and off-the-highway motor vehicles up to their 1944 average quarterly production of these batteries, before undertaking the manufacture of any other type.

Industrial Briefs . . .

• TO REPRESENT — Standard Steel & Wire Corp. has been appointed exclusive sales representative for Brainard Steel Corp., Warren, Ohio, for electrical welded steel tubing in the Chicago district, covering parts of Illinois, Indiana, Iowa, and Wisconsin.

• EXPORT DIVISION—In preparation for postwar foreign trade, Lempco Products Co. has set up its export division as a separate company to be known as "Lempco International," according to a company announcement. Over a period of 20 years Lempco has built up an organization of 36 sales representatives covering foreign markets. Lempco International will export the company's regular line of machine tools, automotive shop equipment, reamers, axles, gears, and a few special noncompetitive automotive parts and tools.

• CANCELS CONTRACTS — Cutbacks in munition schedules has caused cancellation of contracts for plants at Birmingham and Sheffield, Ala. A contract for 75-mm. shell forgings with the Rheem Mfg. Co. at Birmingham was cancelled, as was a contract for 105-mm. shell forging and machining plant at Sheffield. The latter contract had been awarded the J. A. Jones Construction Co. Both plants were under construction.

• MOVES OFFICE—Koehler-Pasmore Co., Detroit representatives of Leland Electric Co., Dayton, Ohio, and other electrical equipment companies, have moved to 8316 Woodward Avenue, Detroit 2.

• CHEMICAL DIVISION — Establishment of B. F. Goodrich Chemical Co., a division of the B. F. Goodrich Co., with offices and laboratories in Cleveland, and manufacturing plants in Ohio, New York, and Kentucky, has been announced. B. F. Goodrich Chemical Co. is engaged in the manufacture and sale of the company's line of Geon vinyl resins, chemicals, and synthetic and reclaim rubbers. William S. Richardson, who has been with Goodrich since 1926, is president of the new company.

• ACQUISITION—Control of the Fedders Mfg. Co., one of the nation's largest independent manufacturers of automobile radiators, has been acquired by Frank J. Quigan, Maspeth, N. Y., manufacturer, and several associates.

• MOVES OPERATIONS—Bell Aircraft Corp. has begun moving the major portion of its Buffalo operations to the Niagara Falls plant in the interest of greatly increased production economy. All operations at the experimental plant in Main Street and a substantial number at the Elmwood Avenue factory are involved. A company statement said from 5000 to 6000 employed in Buffalo will have been transferred to the Naigara Falls works by next fall.

• OPENS OFFICE — The Landis Tool Co., Waynesboro, Pa., has opened offices in the Singer Building, 149 Broadway, New York, with Walter P. Lotz, newly appointed eastern sales manager, in charge.

• ETHYL CHLORIDE — A new process for making ethyl chloride, one of the most important chemicals used in manufacturing Ethyl fluid to produce high-octane gasoline powering allied air fleets, has been announced by Ethyl Corp. A $750,000 unit employing this process is now under construction at the company's Baton Rouge, La., plant.

• NEW DIVISION — Rheem Research Products, Inc., Baltimore, has formed a new marketing division to promote and broaden the use of Iridite, and to develop new product ideas.

Used Materials Included In All of WPB's Regulations

Washington

• • • **WPB recently emphasized that** all of its orders and regulations apply to second-hand or used materials and products (other than scrap) to the same extent that they apply to new products, unless the order or regulation, or a published interpretation of it expressly states otherwise.

In illustrating this rule, WPB officials presented the following examples:

1. Order L-265 regulates the manufacture and distribution of "electronic equipment." The definition of this term in paragraph (a) (3) of the order does not exclude used or second-hand equipment from the coverage of the order. Therefore, all of the provisions of the order apply to both new and used or second-hand electronic equipment.

2. Paragraph (c) of the Order L-190 controls the distribution of new Class D scales. The term "new" is defined in the order. Therefore, the restrictions of paragraph (c) apply only to Class D scales that are "new," as defined in the order.

Interpretation 26 Clarified

Washington

• • • **Pointing out that** the rule is contained in Interpretation No. 26 to CMP Regulation No. 1, WPB said recently that manufacturers of Class B products must use the allotments they have received to fill the higher rated orders on their books if they do not receive allotments sufficiently large to fill their rated orders or if their allotments are reduced so that they cannot fill all of their rated orders.

In illustrating this rule, WPB officials presented the following example:

The manufacturer of ball bearings is given an allotment of 1000 tons of alloy steel. He proposed to use 500 tons of this allotment to get one kind of alloy steel required for AA-1 rated orders, and the other 500 tons to get other alloy steel required for low rated orders. Subsequently, 500 tons of his allotment is canceled. In canceling outstanding authorized controlled material orders (or placing further authorized controlled material orders), he must order only the kind of alloy steel required for his high rated orders.

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British See Need For Continuing International Quotas And Price Controls

New York

• • • Price fixing and international quota agreements may well need to be retained in the British steel industry, according to recent statements in the *London Times*. No big problem of surplus capacity was said to exist in England, as no appreciable expansion has been attempted during the war.

The following tonnage figures for the United Kingdom were cited:

	(000's of tons)		
1935-38 (av.)	11,256	1940-43 (av.)	12,770
1939	13,221	War Peak ('43)	13,031

It is certain that the 1943 peak was not exceeded in 1944, and it is probable that the current rate is below 13,000,000 tons a year. Probably the industry's present effective capacity is only somewhere around 13,000,000 tons a year, as it was in 1939. It is impossible to forecast postwar consumption in precise terms, but the following figures may be a rough guide:

MILL LABOR: *Women at work in the British steel industry today will be completely replaced according to present planning in the industry. Shown are women working on stainless billets.*

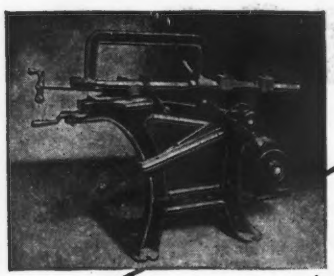
United Kingdom Consumption		Exports	
1935-38 (av.)	10,381	1935-38 (av.)	2274
1939	12,987	1938	1915
1940-43 (av.)	14,867	1939	1040

As a "guided guess" based on the above figures, the total postwar home and export market for the British industry seems unlikely at worst to be less than about 14,000,000 tons. It may be considerably more.

The big task of transition lies rather in the field of fine alloy steel. This industry, concentrated hitherto in the Sheffield area, has had its capacity more than doubled, under direction from the government, by new plants in other areas. There is bound to be a large excess of capacity and the government will be faced with a decision on how to deal with it. For the remainder of the industry there is no reason why peace should not hold out the prospect of a prosperous future, but there are certain problems to be solved.

In the forefront of the troubles stands the price of coal. Nobody knows how far the 100 per cent wartime rise in coal prices in this country may or may not be paralleled in Continental prices. What is known is that prices have scarcely advanced at all in the United States and Canada; where prices are now only about one-half the British.

Another weakness in the postwar picture is that of iron ore. Owing to the cutting-off of most imported supplies during the war, British blast furnaces have had to use a far higher proportion of low-grade home ores (almost 90 per cent, against 65 per cent before the war), while the gross cost of imported ores has been tripled



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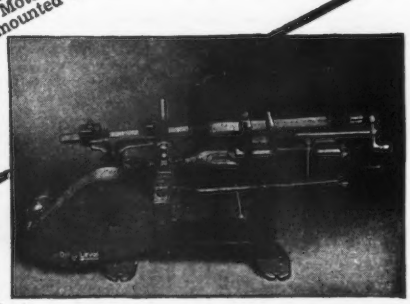

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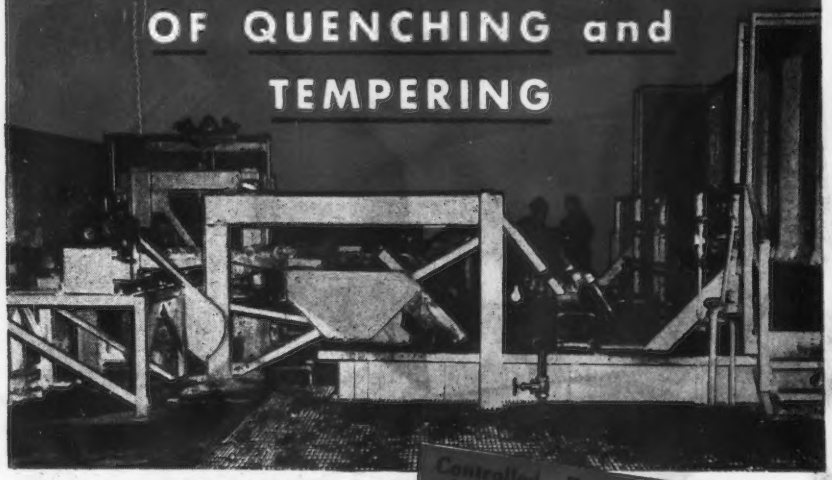

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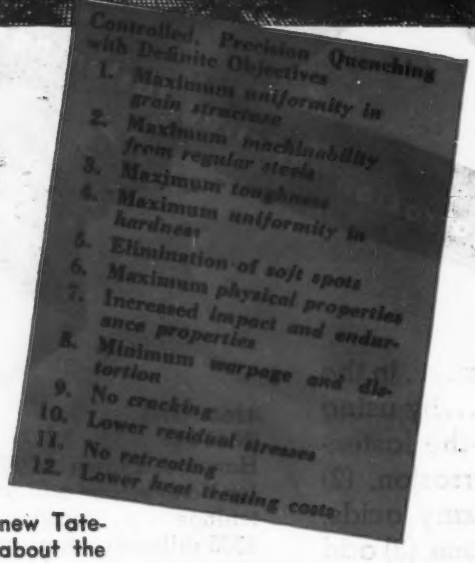
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owing to high shipment costs. At the same time, control of supplies in Britain has resulted in ore being transported over various routes which would be uneconomic in peacetime. Actually, the industry's Central Fund has borne most of the increased costs. But this certainly cannot be continued in peacetime, for it is a safe guess that the Fund could not stand the cost.

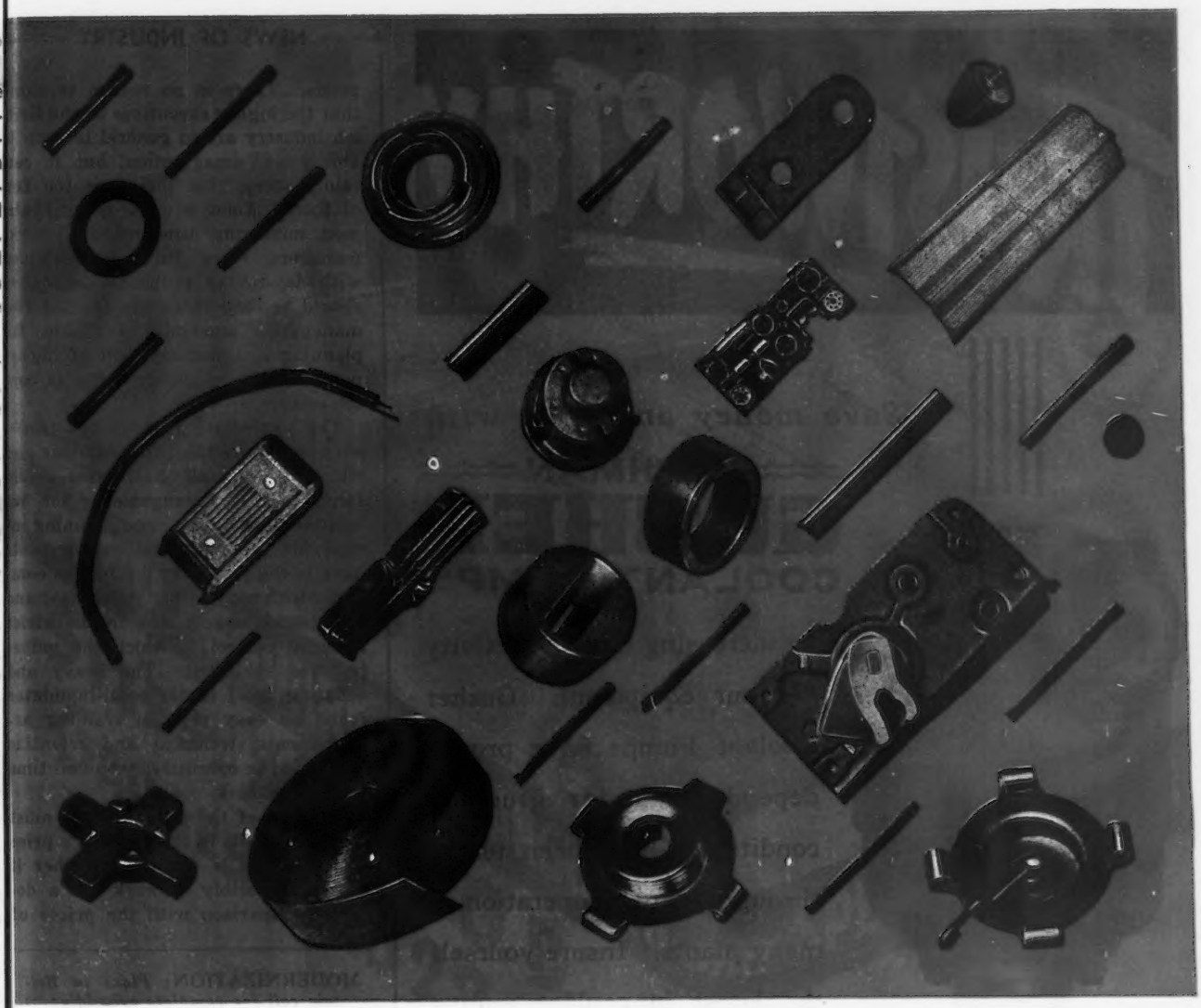
The internal weaknesses of the industry, according to the London daily, follow as a fairly direct result of the history of the past three decades. A period of extensive capital construction at inflated prices from 1914 to 1918 was followed by a period of semi-bankruptcy from 1920 to 1932. With the assistance of import duties, there was a return to a modest degree of prosperity from 1933 to 1939, and during those years, out of profits somewhat seriously curtailed by taxation, the industry managed to spend at the rate of about $40,000,000 a year on re-equipment. This was not sufficient fully to recover lost ground by 1939, and at the beginning of the war, the industry still had a fair proportion of obsolete plants.

How far this was wholly due to the lightness of the industry's treasury chests, and how far to timidity and excessive conservatism, is a matter for argument. In any case, the arrears of maintenance outstanding in 1939 have since been dwarfed by the accumulated obsolescence of 5½ years of war, during which virtually no modernization has been permissible.

The net result is a heavy proportion of obsolete equipment, or equipment requiring major overhaul and reconstruction.

Allied with this question of obsolete plants is another problem. There are too many works which "sprawl"—there is no other word for it—works which are a tangled riddle of gaps, corners, adjacent shops alternately empty and overcrowded, illogical separation, unbalanced, and tortuous routes and methods in the handling of materials. The works where these things exist are works which are old and have too much past history incorporated in their layout. Some of them are reaching a stage where major reconstruction, involving heavy expenditure, is becoming imperative, with the alternative of scrapping and building on a new site.

Another problem is staff, generally common in the older industries particularly in the sphere of the higher executives and leaders on whom the efficiency of everything ultimately de-



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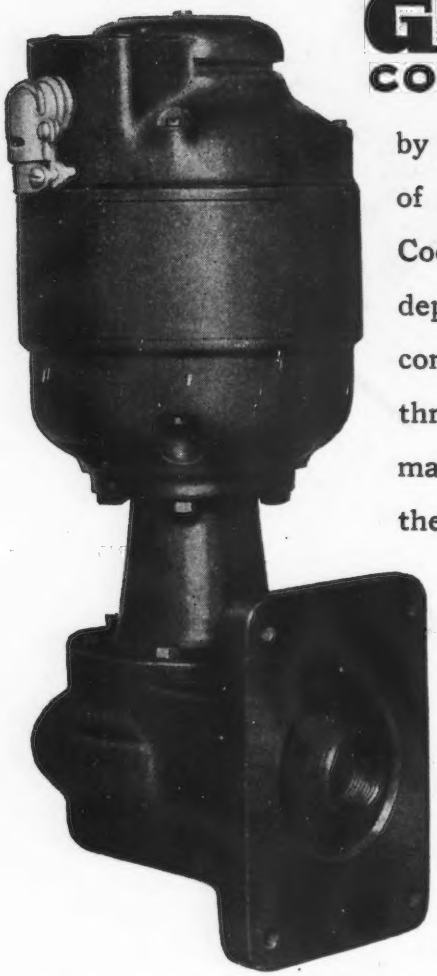

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pends. There is no reason to think that the higher executives of the British industry are in general lacking in ability and imagination, but it certainly seems that there are too few of them. There are too many chairmen, managing directors, and works managers more fully pre-occupied with day-to-day problems than they should be, and there are far too few managerial manhours available for planning and consideration of higher policy, which inevitably suffer in consequence.

The immediate reasons for this—over and above the 1914-1918 war gap which affects all businesses—seem fairly clear. Arrangements for recruitment, selection, and training of men for the higher executive posts have in the past been limited, as compared with many other industries; and this seems largely due to the strict financial control to which the industry was subjected. The heavy and deflating hand of the semi-liquidator found an easy prey in training arrangements, technical and scientific staffs, and in executives who had time to sit and think.

The sum of these weaknesses must show its results in the industry's price structure. It is doubtful whether it is really possibly to work out a detailed comparison with the prices of

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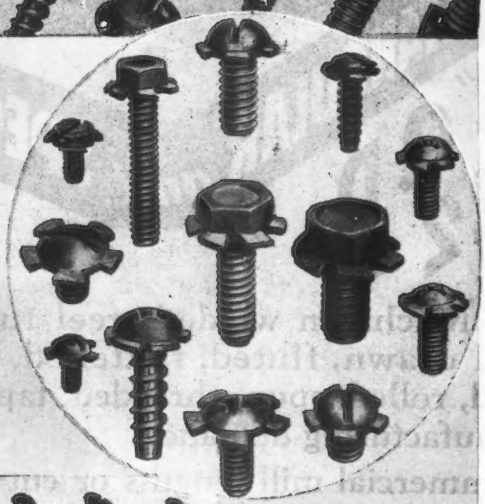

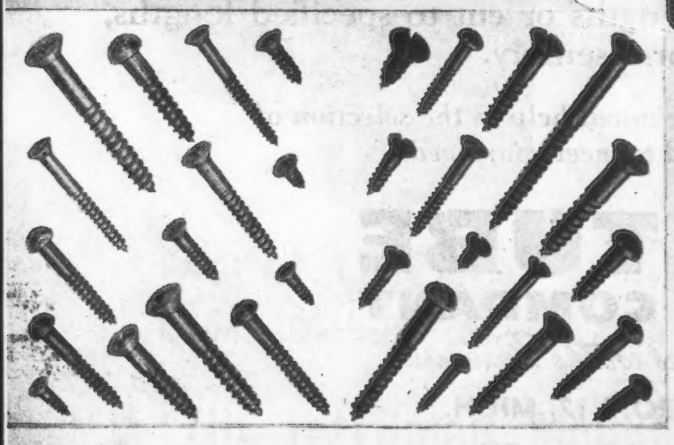

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manufacturers in other countries. The toughest competitors in the prewar world were Belgium, Luxembourg, and Germany; they may be so again after the war, but nobody has the remotest idea what their costs and prices are likely to be. Secondly, even if comparison is limited to the United States, direct comparison is rendered formidably difficult by uncertainties about extras and rebates in respect of quantities and specifications.

The recent estimate by the Minister of Supply, that British prices were, generally speaking, about 25 per cent higher than their American counterpart, has not been seriously challenged, although some think that the difference is much less where comparable delivery terms and comparable willingness to manufacture to individual specifications exist.

The first requirement of the British steel industry after the war will be modernization. Plans already submitted are believed to amount to about $600,000,000 in value, excluding certain minor projects, and the eventual total for the early years may be considerably higher. The finding of these large sums clearly cannot be taken for granted, but it may not prove unduly difficult in practice. The industry will finish the war with a fair amount of funds in hand—representing most of five to six years of depreciation, plus small amounts of retained net earnings.

But, since all depreciation has necessarily been more or less on 1939 book values, and the price of equipment has risen 70 to 80 per cent, this will not necessarily cover even the cost of making good the backlog, let alone the arrears of obsolescence which existed before the war. The industry will have the benefit of the promised 20 per cent tax allowance on new construction, but will get little from the postwar credit, since steel prices have in the main been held to levels at which excess profits are not earned (perhaps some compensation may be given for this). All in all, it seems that a certain amount of new capital, perhaps up to about $200,000,000 (depending on the level of prices) will be needed from the investing public. Since for a while at least steel capacity is likely to fall short of demand, and there is, therefore, no reason why adequate profits should not be earned, it is hard to see why there should be any great difficulty in raising such new money as may be needed.

A greater danger, perhaps, is that desirable capital expenditure which is

Picture of Man Doing the *Impossible*

NO one had ever built a 6000-ton mechanical press. But war needs demanded one. Then the engineers found that the orthodox cast columns with tie rods wouldn't do the job.

But, making each column of four 6" thick steel plates and welding them together proved practical. Greater strength with less elongation under load could then be had at a 25% saving from cast steel construction.

The only problem was what electrodes and welding technique to use so as to prevent breaking the welds or buckling the 70-ton columns in the subsequent heat treatment required.

A. O. Smith welding engineers worked out a special technique and specified SW-35 electrodes for the first passes of each weld and SW-20 for all the finishing passes. It worked—"the impossible" was done!

The complete success of this unique welding job is evidenced by the fact that this 6000-ton press is now turning out critical war forgings 24 hours a day.

More than 320,000 SMITHway Certified Electrodes are used daily in A. O. Smith plants alone. They have helped many industries advance by making the most of welding as a modern production tool. Write for catalog.

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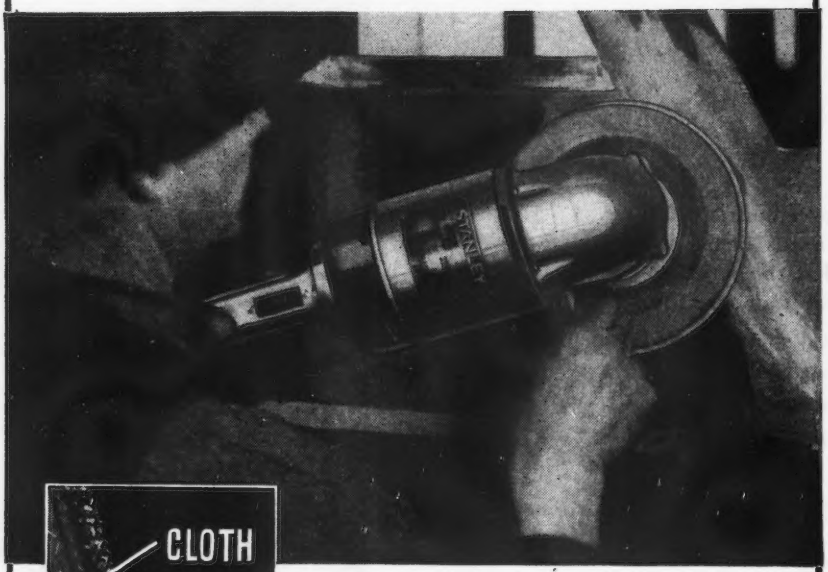

. . . their 3-ply backing stands up to anything!

SEE THAT SINGLE PLY of fibre – especially treated and pressed for double strength and hardness. That's what keeps Weldisk edges from going flabby.

AND THOSE 2 PLIES of heavy cloth, encasing the fibre! That's what keeps Weldisks from cracking when bent.

IN ADDITION to this unique 3-ply backing, there's one more thing that gives Weldisks exceptional stamina. It's the grit itself – made from electric furnace treated aluminum oxide, hardest, longest-lasting abrasive in commercial use.

TOUGH GRIT! Tough 3-ply backing! That's why Weldisks cut faster and longer. That's why they're safer, more economical to use. For getting out work, nothing like Weldisks! Try them! All grits 320 to 16.

Abrasive Products, Inc., South Braintree, Mass.

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"economic" in real terms, may be blocked because artificial prices make it financially unprofitable. In several recent cases calculations in England have shown that the expected profit on a new integrated steelworks would only cover capital charges by a small margin with sustained full production, while any material fall below full output would mean a loss.

For this surprising result two factors seem chiefly responsible. One is that the rise in new plant prices (70 to 80 per cent) has been much greater than the rise in the "conversion" price of steel, for the price of steel has been raised by very little more than the margin required to cover increased raw material costs. This must eventually be solved by a fall in plant prices, a rise in steel prices, or a fall in the price of coal and coke, or a combination of all these. Further, steel prices themselves are now in an arbitrary relation one to another. Three of the estimates mentioned above were concerned with billets, and the price of billets is far less profitable than that of the products into which they are re-rolled. This is simply one example of the fact that the steel price structure has been frozen at the relationships which prevailed before the war, governed largely by Belgian and Luxembourg competition. The price structure will require rationalization, and it may well be that prices may have to be increased all round—present prices are probably less remunerative than might be imagined.

Although the industry does not face any surplus capacity problem in general, it will have to deal with one problem of an unneeded plant of a specialized kind. Certain processes in the industry which have in the past lent themselves to moderate-scale working are now becoming the affair of large-scale and expensive plants; the strip mill for light sheet and tin plate, the continuous billet mill, the continuous rod mill, and (if some people in the industry are correct) the "Universal beam mill" for heavy joists, all belong to this type. This development may in some cases mean cooperative investments by the present members of the trade concerned.

Two requirements are essential in such cases if the industry is to avoid burdensome handicaps for the future. The first is that the new enterprise should be unencumbered by any capital expenditure for purchases or compensation in respect of old plant. The second is that the government and the public must refrain from forcing new plants into locations which are

Put this

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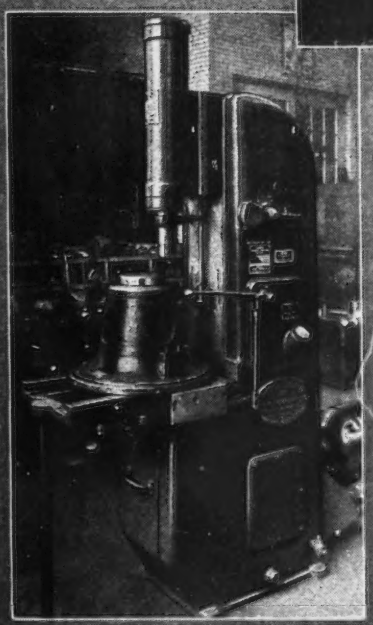
Let *American* engineers show you how standard *American* equipment can serve you in war production today, yet be easily converted to perform your peacetime manufacturing operations. There is no obligation. Write today for further details.



The flexibility of the standard V-1-½ machine is graphically illustrated in the accompanying photographs. The upper picture shows the set-up for broaching a dovetail slot in rifle sights. High rate of production is maintained with ease of handling. The illustration at left shows the same machine tooled for assembling studs in an aircraft gear housing. This set-up features automatic indexing and locating of the part for pressing home the studs.

Protect your broaching tools when not in use. Tools last longer and give more satisfactory service if this precaution is taken.

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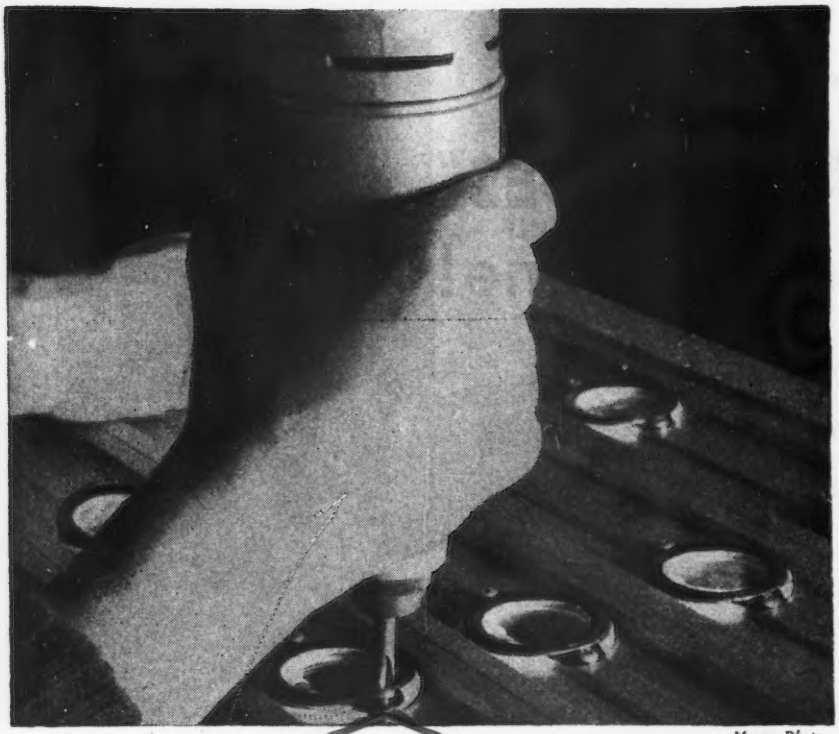

Meyers Photo

Saves Seconds CENTERED DRIVING! **Avoids "Seconds"**

When a slip means a reject, you'll find CENTERED DRIVING with Corbin-Phillips Screws to be an *extra* money saver for you. The Phillips Recessed Head holds the driver in a four-point grip of steel — keeps the driver from slipping and marring the work or causing painful injury. You can fasten faster and stronger with less screws when you use CENTERED DRIVING and Corbin-Phillips Screws. S-3

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uneconomic, through insufficient proximity to raw materials or markets.

The next requirement is the reintroduction of some incentive from competition and from rewards for efficiency. This has, of course, been wholly lacking during the war. Modernization will not be carried out if this situation persists in peace. The wartime stabilization of the British industry under controls has led to the building up of an extremely complex structure, some of which in a less rigid form may remain permanent. Price fixing and probably international quota agreements, with public supervision which is indispenable, may well be necessary. Clearly, the construction of actual blast furnaces and melting shops or of large integrated units, involving probably an optimum output of about 500,000 tons a year for a single works, must be subject to some sort of control.

The last group of requirements comprises those which relate to matters outside the industry or which do not come primarily within the industry's own control. On the supply side coal and iron ore have already been mentioned. Coal is certainly the biggest single difficulty. The labor problems are very far from insoluble given reasonableness on both sides. Some of them will probably solve themselves automatically after the war. Finally, there is the question of control of imports by tariff or quota. There is no gainsaying that the financial and limited technical recovery of the industry dates from the imposition of import duties. There would in any case need to be some protection for the industry if the United States, with a capacity and a home market some seven times the size of the British, started to dump surpluses at prices representing direct costs only. But there is equally a good case for allowing entry into the United Kingdom of foreign "semis" provided that the users get them cheaper than is possible from home sources and that exports of manufactures are thereby facilitated.

Seek Additional Export Orders

Boston

• • • With negotiations practically completed to furnish machine tools to Russia and some South American countries, Van Norman Co. is making a strong bid for some of that $100 million French business. At present the company is producing machine tools as well as shells for the army.

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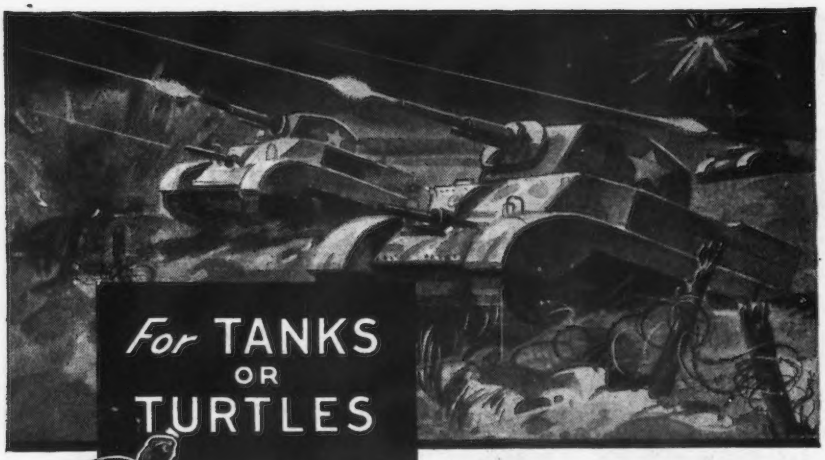

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IngAclad Stainless-Clad Steel—product of the Ingersoll Steel Division of Borg-Warner Corporation—is mild steel "armored" with a ply of stainless steel. The two metals are so perfectly bonded into a single sheet or plate that only by looking at the edge or back of the metal can you detect that it is not solid stainless.

In operation it gives real stainless service on the side that is used, yet costs much less than the solid metal. By specifying IngAclad Stainless-Clad Steel when you add new or rehabilitate old equipment you will effectively and economically armor your plant against corrosion.

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Canadian Production At Increased Level Awaiting New Cutbacks

Ottawa

• • • Canada's war industry now is operating at its highest efficiency, C. D. Howe, Minister of Munitions and Supply, announced. He stated that in the past year, with about 675,000 men and women working, Canadian plants turned out materials with a cost value of more than $2,200,000,000, which compares with 848,000 persons employed as at July 1943, when for the fiscal year 1943-44 war production had a cost value of $2,500,000,000.

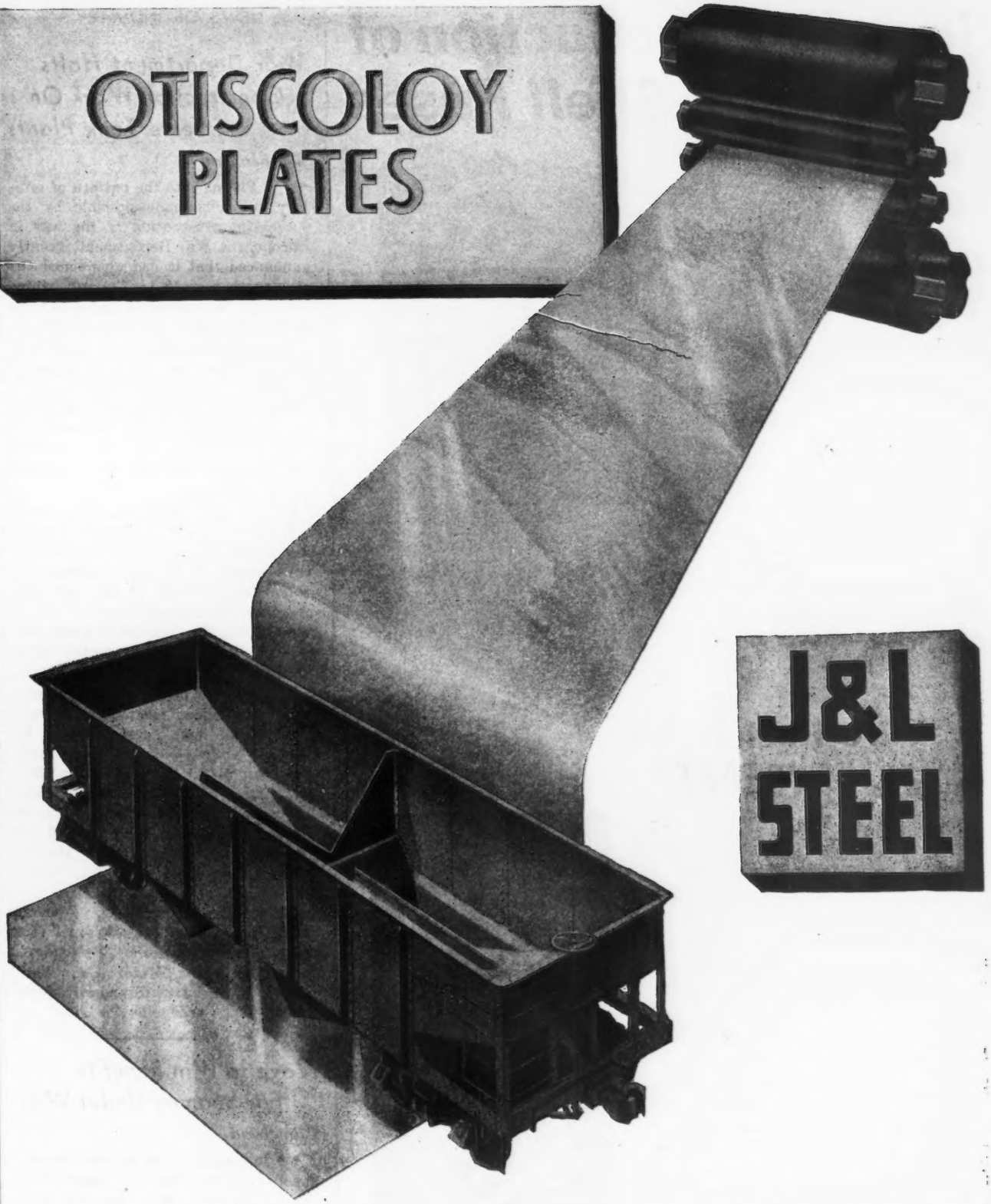
Due to increased efficiency there has been only a slight drop in the value of our war production, Mr. Howe stated. Our manufacturing industries are now operating at peak production consistent with available manpower, and this level of production will continue at least until the end of the war in Europe. "After that," Mr. Howe added, "the war with Japan will demand a large percentage of the output of our mnufacturing industries. Any capacity not required for war will be converted immediately to civilian production."

Mr. Howe presented figures dealing with Canada's war production from 1939 to 1944 inclusive with production figures for 1945 in connection with which contracts have been awarded. With regard to the latter, however, he pointed out in the 1945 program that except where items are for use in the Pacific war, the estimates are subject to the revision which must be made when the war in Europe ends. Further it should be pointed out that some of the 1945 estimates have been upset due to cutbacks in United States orders in the past few days. The figures are as follows:

Production Totals and Estimates

	1945 Program	1944 Production	Total Sept. 1, 1939 Dec. 31, 1944
Aircraft—Planes	2,281	4,178	14,896
Aircraft-weight (million lbs.)	21.3	27.9	.....
Cargo Ships (10,000 tons)	40	.....	314
Cargo Ships (4,700 tons)	12	.....	31
Chemicals (million lbs.)	1,350	1,350	3,350
Guns—Barrels and Forgings	24,000	16,100	82,000
Guns—Mounts and Carriages	2,200	3,200	27,200
Small Arms (units)	250,000	530,000	1,475,000
Mech. Transports (units)	122,000	147,000	700,000
Rail equipment—Locomotives	439	187	.....
Rail equipment—Cars	14,500	8,948	.....
Construction (millions)	$35	$100	$745
Armored fighting vehicles	.....	14,200	45,700

OTISCOLOY PLATES



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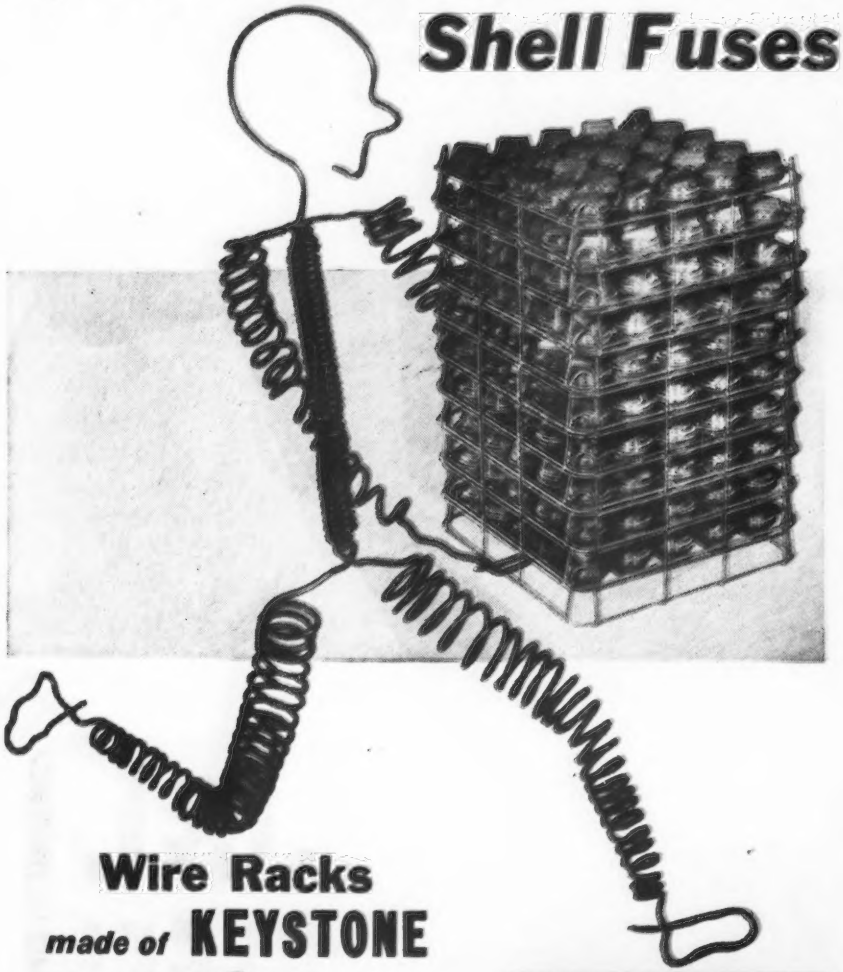
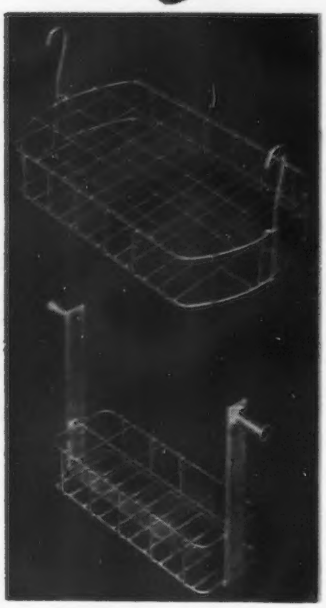
Speeding Production of Shell Fuses



Wire Racks made of KEYSTONE Wire



More than *half a million* wire racks made by *Commercial Platers Company are now being used in war plants . . . helping speed assembly line production of shell fuses, airplane parts, and shot ammunition. These racks are made of Keystone wire . . . again proving the versatility and adaptability of Keystone's wire mill production. We are indeed proud that Keystone wire is privileged to serve in thousands of fighting forms as actual parts of ships, planes, tanks and ammunition, as well as on wartime assembly lines.

*Commercial Platers & Manufacturers, Inc., Rockford, Illinois

KEYSTONE STEEL & WIRE CO., Peoria 7, Illinois

Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE

Coppered, Tinned, Annealed, Galvanized

War Department Halts Construction Work On Twelve Tank Plants

Washington

• • • Fitting into the pattern of military cutbacks made possible by the successful prosecution of the war in Europe, the War Department recently announced that it had abandoned the construction of 12 tank plants which could not be completed and reach capacity of production until autumn.

"American production is now at a level which assures American fighting men of a sufficient production rate to complete the war against Germany and provide the output necessary to supply forces to be used against Japan," said the War Department statement.

It was emphasized that this action is not a cutback in production but the elimination of a planned increase in tank output. It was also pointed out that, because most of the proposed operations would have been in critical labor areas, this change in plans will ease the present and expected labor shortages in these areas.

Four of the projected tank plants would have been located in Detroit. They would have been operated by Chrysler Corp., Chrysler subcontractors, Ford Motor Co., and General Motors. Other planned expansions were: American Steel Foundries cast armor plant, East Chicago, Ind.; Ford Motor Co., Dearborn, Mich.; General Motors, Fisher Body Division, Flint, Mich.; Oilgear Co. and subcontractors, Milwaukee; Ordnance Steel Foundry plant, Quad Cities Tank Arsenal (International Harvester, Bettendorf, Iowa; Waukesha Motor Co., Waukesha, Wis., and Standard Steel Spring Co., Coraopolis, Pa.

Move to Win Benefits For Seamen Under Way

Cleveland

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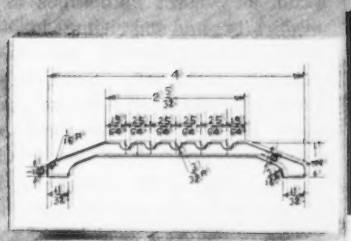
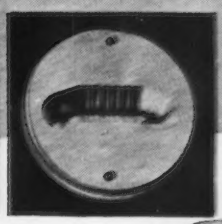
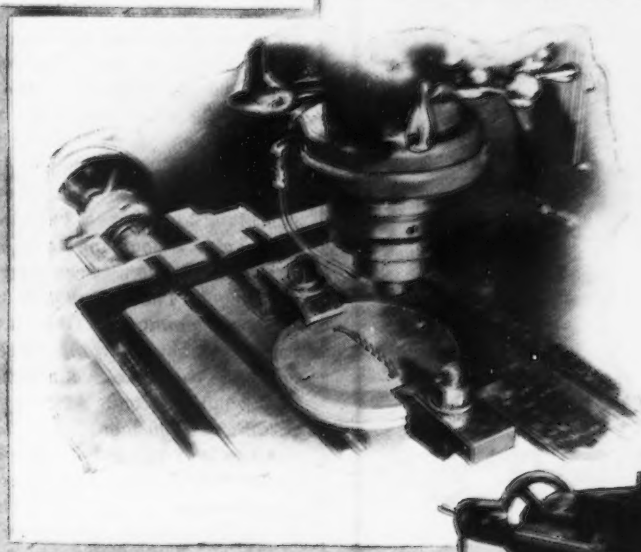
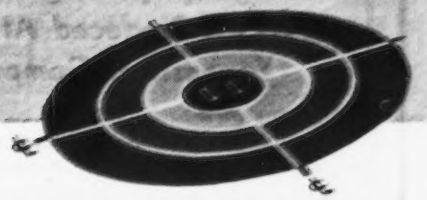
Gilbert R. Johnson, counsel for the association, who initiated the move before the Ohio Senate Committee on Commerce and Labor at Columbus, pointed out that seamen "are the only class of industrial employees excluded from benefits under the state's

Would You Need More than 10 hours To Mill this Extrusion Die ?









The speed and accuracy with which this extrusion die was milled is unusual — but it's typical performance for a Milwaukee Rotary Head Milling Machine — the most versatile machine ever designed for die and mold work. *Read this job report:*

Material . . . High Vanadium — High Speed Steel. **Operation** . . . machine orifice of extrusion die. **Time Distribution** . . . set up, ¼ hour; layout, ¼ hour; rough mill outline, 3/16" deep, 2 hours; rough drill opening through die, 1 hour; finish mill outline, 3/16", 2½ hours; square cut corners with slotting attachment, ¾ hours; mill lead side of die, 3¼ hours; **Total Time** — 10 hours. No templets were required.

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DIRECT — mills mold cavities in a single set-up without the aid of templets or models.

ACCURATE—no changes in set-up eliminates chances for error. Exact control of all combinations of cutting movements — possible only with this machine — transmits mathematical precision to the work.

FAST — initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of the intricate molds and dies is the result. Write for Bulletin No. 1002C and complete information.

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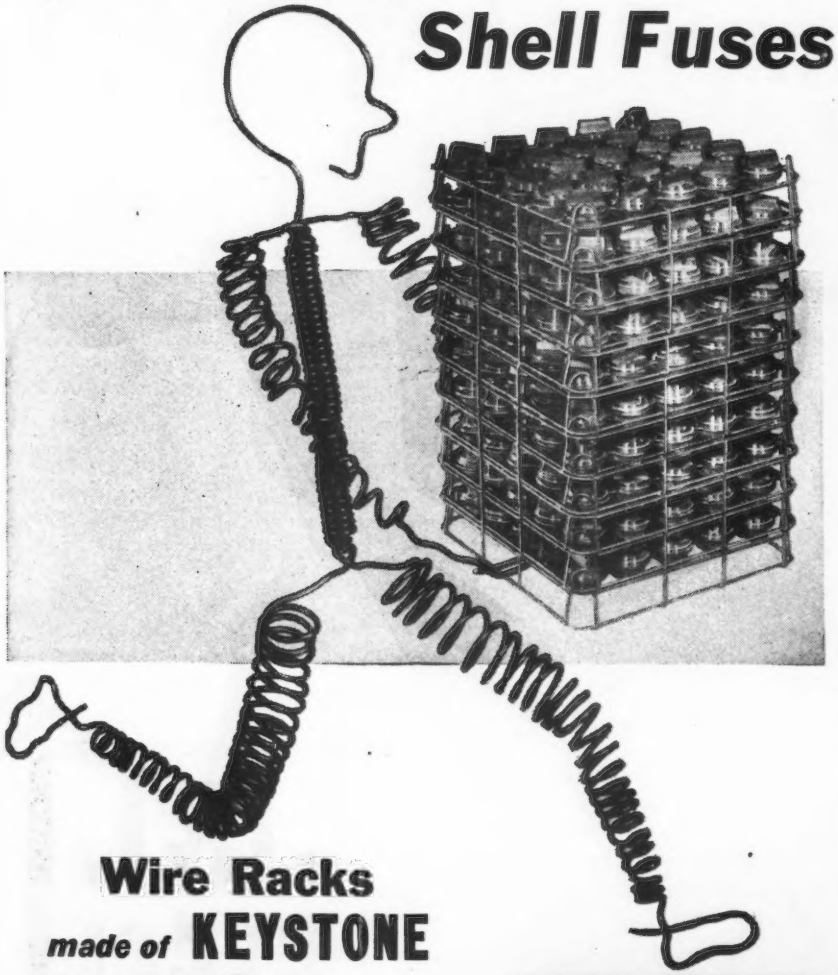
Speeding Production of Shell Fuses



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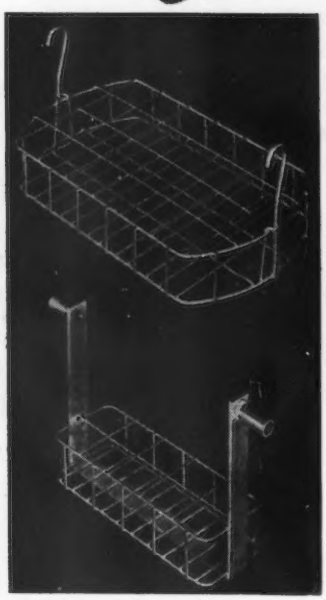

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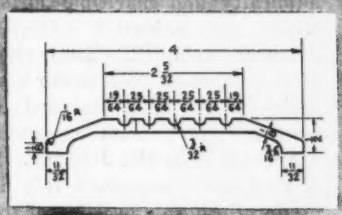

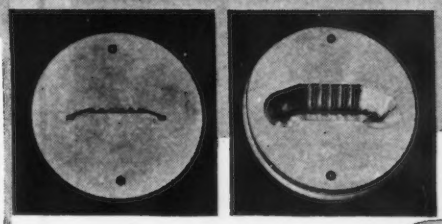

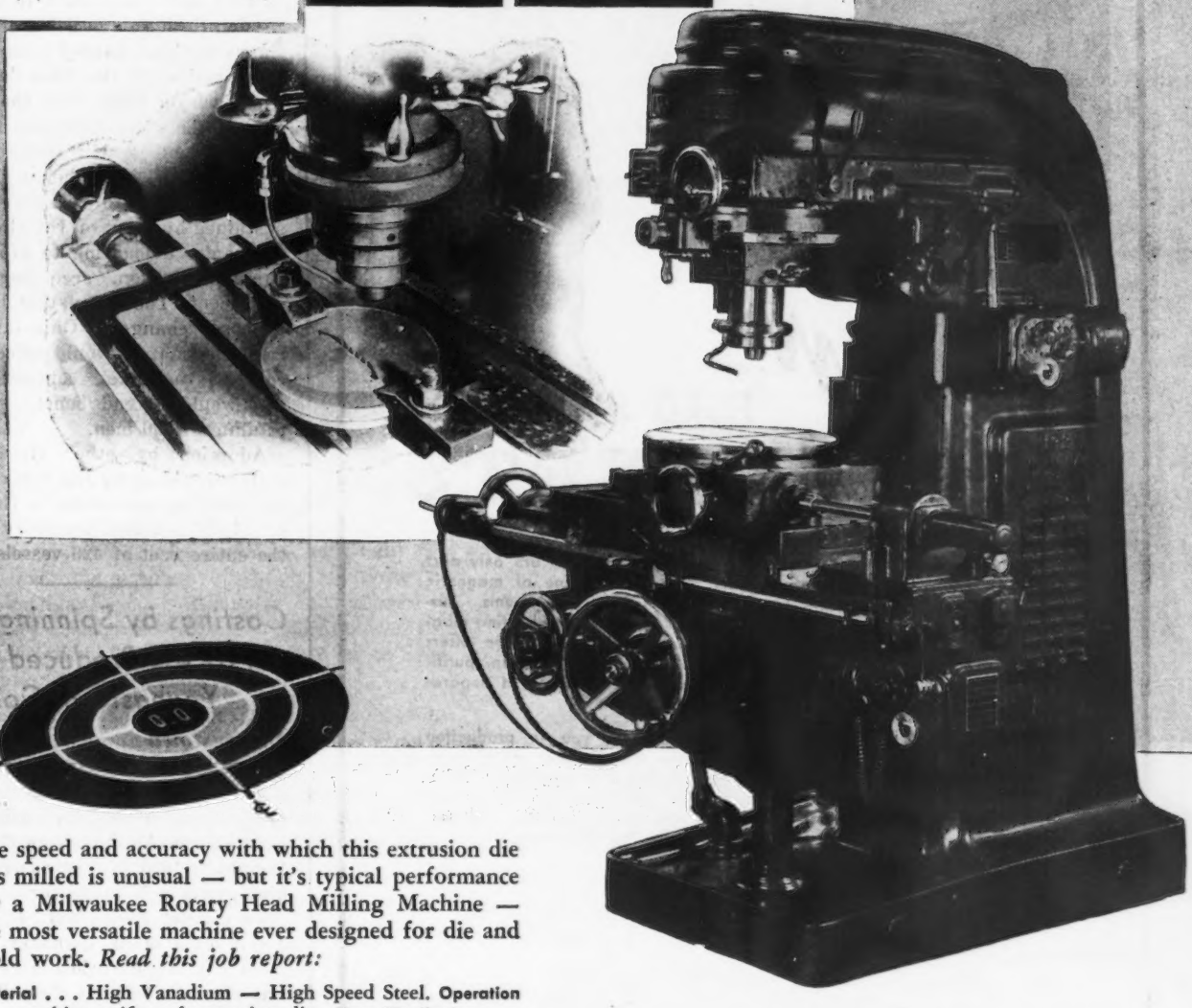

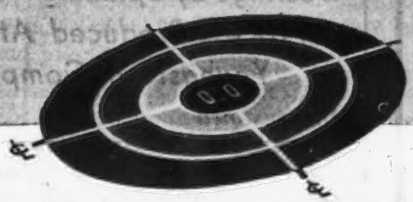

The speed and accuracy with which this extrusion die was milled is unusual — but it's typical performance for a Milwaukee Rotary Head Milling Machine — the most versatile machine ever designed for die and mold work. *Read this job report:*

Material . . . High Vanadium — High Speed Steel. **Operation** . . . machine orifice of extrusion die. **Time Distribution** . . . set up, ¼ hour; layout, ¼ hour; rough mill outline, 3/16" deep, 2 hours; rough drill opening through die, 1 hour; finish mill outline, 3/16", 2½ hours; square cut corners with slotting attachment, ¾ hours; mill lead side of die, 3¼ hours; **Total Time** — 10 hours. No templets were required.

Check these advantages of the Milwaukee Rotary Head Mill Machine and how you can benefit from them in your own shop:

DIRECT — mills mold cavities in a single set-up without the aid of templets or models.

ACCURATE—no changes in set-up eliminates chances for error. Exact control of all combinations of cutting movements — possible only with this machine — transmits mathematical precision to the work.

FAST — initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of the intricate molds and dies is the result. Write for Bulletin No. 1002C and complete information.

BUILDERS OF MILWAUKEE ROTARY HEAD MILLING MACHINE • MIDGETMILL • SPEEDMILL • FACE MILL GRINDER • AUTOMETRIC JIG BORER • CENTER SCOPE.

Kearney & Trecker

Products

CORPORATION

Milwaukee 14, Wisconsin

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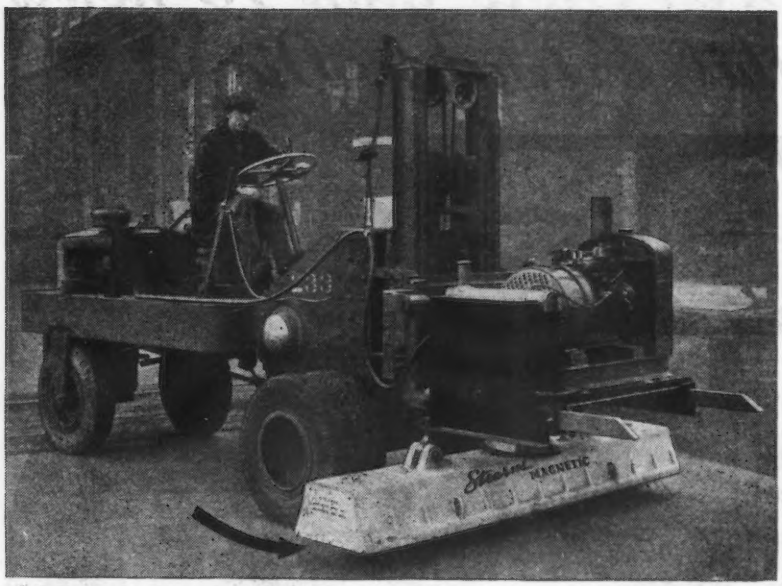


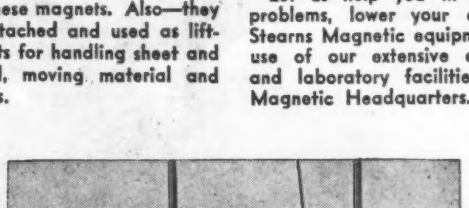
Stearns ROAD SWEEPING MAGNETS

Tire conservation means keeping roadways clear of tramp iron and metallic refuse. Large industrial operations of all kinds are using Stearns Road Magnets with surprisingly profitable results.

And—the value of the scrap metal thus recovered has paid for many of these magnets. Also—they can be detached and used as lifting magnets for handling sheet and other steel, moving material and similar jobs.

Magnets like these are only part of the extensive line of magnetic separators, pulleys, drums, suspended separation and lifting magnets that Stearns Magnetic offers for protection, reclamation, purification, concentration and separation purposes.

Let us help you in production problems, lower your costs, with Stearns Magnetic equipment. Make use of our extensive engineering and laboratory facilities. Consult Magnetic Headquarters.



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Stearns MAGNETIC MFG. CO.

SEPARATORS — DRUMS — ROLLS
CLUTCHES — BRAKES — MAGNETS

635 So. 28th Street, Milwaukee 4, Wis.

present unemployment compensation laws."

"That came about because the operation of vessel companies is under admiralty and maritime jurisdiction, which are federally administered," Johnson explained. "Since unemployment compensation is under state law, both vessel operators and seamen were exempted from its provisions."

According to Mr. Johnson, the way is now open to correct this discrimination through a decision of the U. S. Supreme Court handed down since the last session of the Ohio legislature. The decision holds that the jurisdiction of the state does not, in this instance, conflict with admiralty and maritime law, Mr. Johnson said.

The benefits to seamen would be sustained by a tax on vessel operating companies amounting to $750,000 per shipping season, according to the statement. The association said if the proposed change in Ohio law is carried through, it would affect 75 per cent of the lake's commercial fleet and would extend benefits to crews totaling 11,030 men.

Adoption by other Great Lakes states would apply the 3 per cent tax on operating companies to the payroll of 14,426 seamen necessary to crew the entire fleet of 429 vessels.

Castings by Spinning Process Produced At Youngstown Company

Youngstown

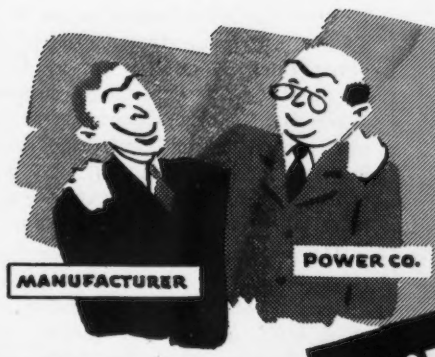
• • • Perhaps the largest steel casting ever produced by the "spinning" method was poured recently by the Youngstown Alloy Casting Corp. here. Weighing 1600 lb., the casting was a high-grade roll made for a Youngstown district steel plant. It was produced on a 60-in. diameter spinning table, one of the world's largest, which was recently built at the Alloy Casting company's plant.

According to Jack Trantin, president of Youngstown Alloy Casting, "this proves that the spinning process, which is coming to be widely used in the steel casting business, can be used successfully in making larger castings."

Extreme precautions were taken in pouring the casting and the molten steel was poured into the mold by remote control to prevent injury to workmen in case the mold burst. Mr. Trantin said 1900 lb. of molten steel had to be poured to make the casting. "And," he added, "1900 lb. of molten steel, being whirled around by cen-

NOW . . . RESISTANCE WELDING AT

Near Unity Power Factor (less KVA)



"THREE-PHASE"

Manufacturers and power companies have long been at odds over the problem of supplying power for heavy reactive loads. Particularly in the case of heavy duty resistance welding of steel, power suppliers have often found it necessary to place a ***demand charge*** on the manufacturer.

One reason for this is that conventional welders must utilize the comparatively high frequency alternating current in their secondary circuit. High frequencies mean high reactance, with resultant operation at very low power factor — often 25% or less. Low power factor means more current must be available to meet the same demand . . . often requiring a boost in the size of distribution facilities.

Sciaky "THREE-PHASE" welders are designed to overcome this, as well as other difficulties encountered in heavy duty resistance welding. An ideal low frequency current is produced at the electrode tips by an ingenious system of first, rectifying all three phases of the supply to d.c., then reconverting to an alternating impulse. Operation is on a ***balanced three phase load*** at ***near unity power factor.***

Bulletin 204-A describing fully the Sciaky "THREE-PHASE" principle will be gladly sent on request.

The Sciaky THREE-PHASE principle has been effectively applied to heavy gauge seam welding. The machine illustrated (type PMM.2T-13) welds steel up to two thicknesses of .109" and can achieve a speed of 84" per minute on two thicknesses of .040". Transformer rating is 120 KVA at 50% duty cycle. Unit is entirely self-contained with hinged side mounted rectifier and control cabinets. Electronic controls provide adjustable on-off time, squeeze and hold time.

SCIAKY BROS.

Complete line of AC and DC Electric Resistance Welding Machines

4915 West 67th Street, Chicago 38, Illinois

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In England: Sciaky Electric Welding Machines, Ltd., London

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SHAPED WIRE • When you can "do it with wire" you cut production cost. Perhaps **PAGE** can show you how. Certainly **PAGE** can produce wire shaped to your specifications, drawn from Stainless Steels, Carbon Steels or Armco Ingot Iron, up to .250" square and widths to ⅜".

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GENERAL WIRE • Spring wire, rope wire, aircraft wire, telephone wire—think of *any* kind of wire and **PAGE** either makes it or can make it for you.

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. . . get in touch with Page!

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PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

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trifugal force, could do a lot of serious damage if it were to let go."

Casting steel by the centrifugal process instead of the "static process" has the advantage of producing a more uniform quality and a much better yield from molten steel. Also, it enables steel foundries to cast to finer dimensions, thereby reducing expensive machine work, Mr. Trantin said.

Steel foundries ordinarily get 35 to 40 per cent from steel poured in the old method, while they get up to 60 per cent by the centrifugal process. When Mr. Trantin was unable to buy new equipment for centrifugal casting, he designed and built his own spinning tables, incorporating some ideas which have since been patented.

He recently organized a new company to market the equipment built under his patents, and the first equipment built under these patents will go to Russia, which has been very short of steel foundry facilities. Three representatives of the Russian Government who are inspecting industrial plant equipment in this country will visit the Youngstown Alloy Casting Corp. soon to study operations.

Eases Regulations On Idle and Excess Items

Washington

• • • **WPB recently** liberalized the restrictions on the sales of surplus, idle or excess materials in a revision of Priorities Regulation No. 13.

From now on, surplus steel and other metals may be sold to persons desiring to establish wholesale or retail businesses. Previously, these kinds of sales required WPB's special permission.

However, where a seller doesn't know what a buyer is going to do with the material he purchases, he may protect himself by getting a certification from the buyer that will establish one of the following situations:

1—That he is a producer of the material or product he is buying; 2—that he is a reprocessor of it; 3—that he will in good faith offer it for sale in substantially the same time and manner as would a person regularly dealing in these materials or products; that he will render substantially the same type of services as such a person, and that he will comply with all applicable WPB regulations; 4—that he is buying the material for use and not for resale and will use it in com-

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A TYPE FOR EVERY NEED

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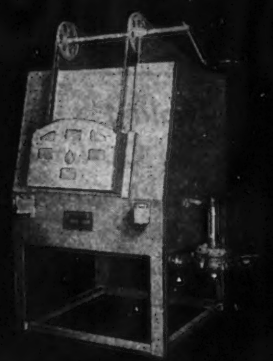
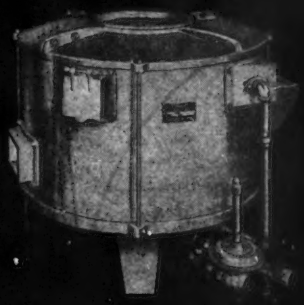
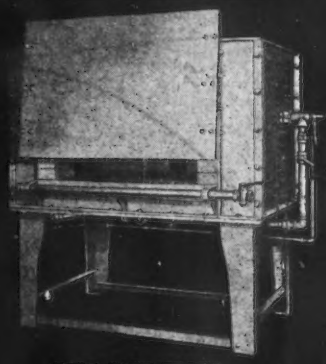
STANDARD INDUSTRIAL FURNACES



SEMI-MUFFLE OVEN FURNACE

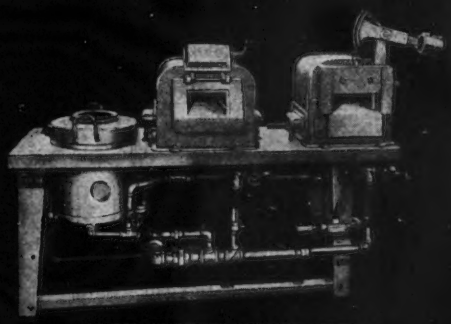


ROUND POT FURNACE



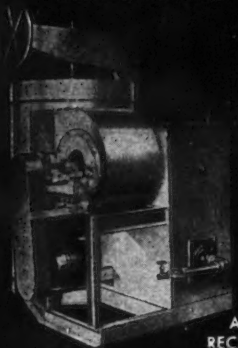
OPEN SLOT FORGE

STATIONARY METAL MELTING FURNACE

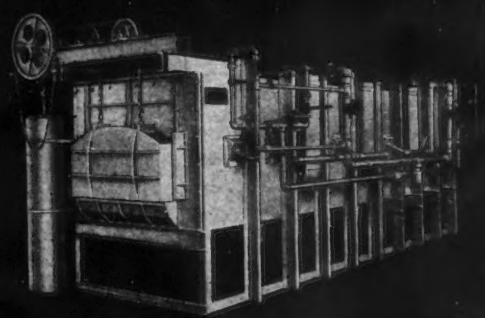


TRIPLE PURPOSE COMBINATION

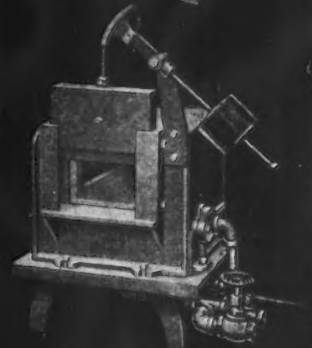
SMALL FORGE



AIR DRAW RECIRCULATING FURNACE



HEAVY PORTABLE OVEN FURNACE



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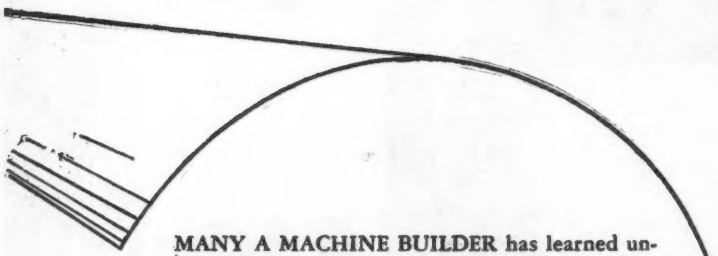
A LESSON FOR NEW PRODUCTS



MANY A MACHINE BUILDER has learned under wartime pressure the amount of machining that Laminum shims save . . . and new peacetime products will benefit! (1) Quicker fitting of bearings, gear mesh, etc. (2) Certainty of uniform accuracy because of the precision gauge of the laminations. Want performance data?

Laminum shims are cut to your specifications. For maintenance work, however, shim materials are sold through industrial distributors.

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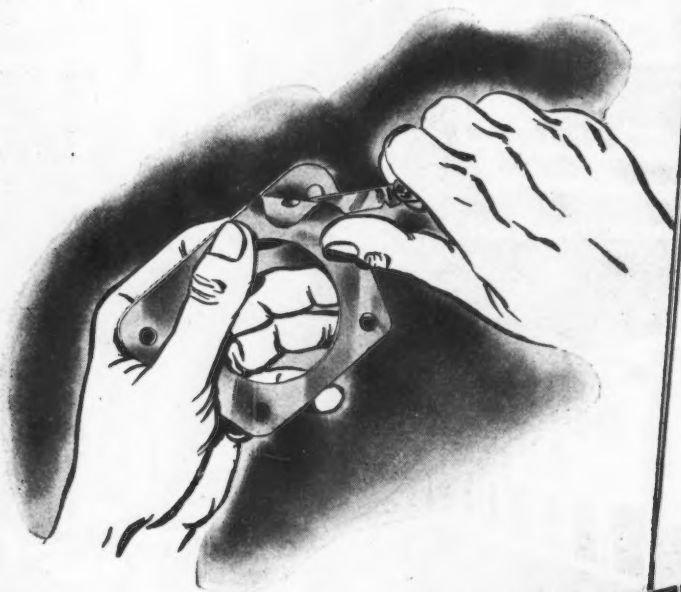

LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

2223

pliance with all applicable WPB regulations and orders.

In the case of items of which there is a shortage for domestic use, the certification is limited to the third one. In this connection the standard certification provided in Priorities Regulation No. 7, may not be used in place of this certification, WPB said.

WPB told sellers, however, that they cannot sell materials acquired with priorities assistance, if they can still be used for the purpose for which the assistance was given. At special sales, preference ratings held by the buyer do not oblige a holder to sell. However, if the owner of the material sells and the buyer gives a rating, the seller must honor it to the extent required by Priorities Regulation No. 1.

Critical Tooling Schedule Outlined By WPB Committee

Washington

• • • **Preparing for transition to civilian production, the WPB Production Executive Committee has outlined a schedule for the manufacture of critical bottleneck types of machine tools and related capital equipment. PEC is the ranking policy-making group of WPB and includes in its membership representatives of the Army, Navy and WMC.**

The first major item in this reconversion program, WPB Chairman J. A. Krug said, is approximately $50,000,000 worth of machine tools and related equipment for the automotive industry. The tools involved in this program, he pointed out, are those on a screened list of bottleneck items that are essential for reconversion of automotive plants to passenger car production. It was explained that virtually all of these tools have a "long lead time" and will require from three to seven months for production after they are scheduled by the machine tool builders. Most of this equipment has been on order with machine tool producers since last fall but the orders have been unrated.

In line with the PEC recommendations, WPB is now working out the mechanics for allowing these orders to be included in machine tool production schedules in such a way that the production will not interfere with production of items needed in the continued prosecution of the war. Early announcement of these procedures is expected, Mr. Krug said.

Economical—no fittings required.
Lightweight, flexible, easy to use.
Use of endless ropes in braided body eliminates conventional eye splices.
Use them in a basket or in an inverted basket hitch.
Buy them singly or in pairs.
Faster delivery than other slings because you don't have to wait for fittings.

Keep Production Moving! Use MACWHYTE ATLAS Loop-Eye BRAIDED WIRE ROPE SLINGS

These sizes and strengths can be made in the lengths you need:

Write on your company letterhead for Macwhyte Sling Catalog and pictorial literature. Address Macwhyte Company or any of our distributors and mill depots near you.

* 8-part Atlas Braided Slings have a body approximately 4½ times the diameter of the rope used.

Buy More War Bonds—
Hold what you have!

Diameter* of Rope Used Inches	Breaking Strength in Tons of 2000 lbs.
3/32	2.47
1/8	3.86
5/32	8.57
1/4	16.24
5/16	25.20
3/8	35.28
7/16	47.04
1/2	60.48
9/16	75.60
5/8	92.96
3/4	132.72
7/8	180.32
1	235.20

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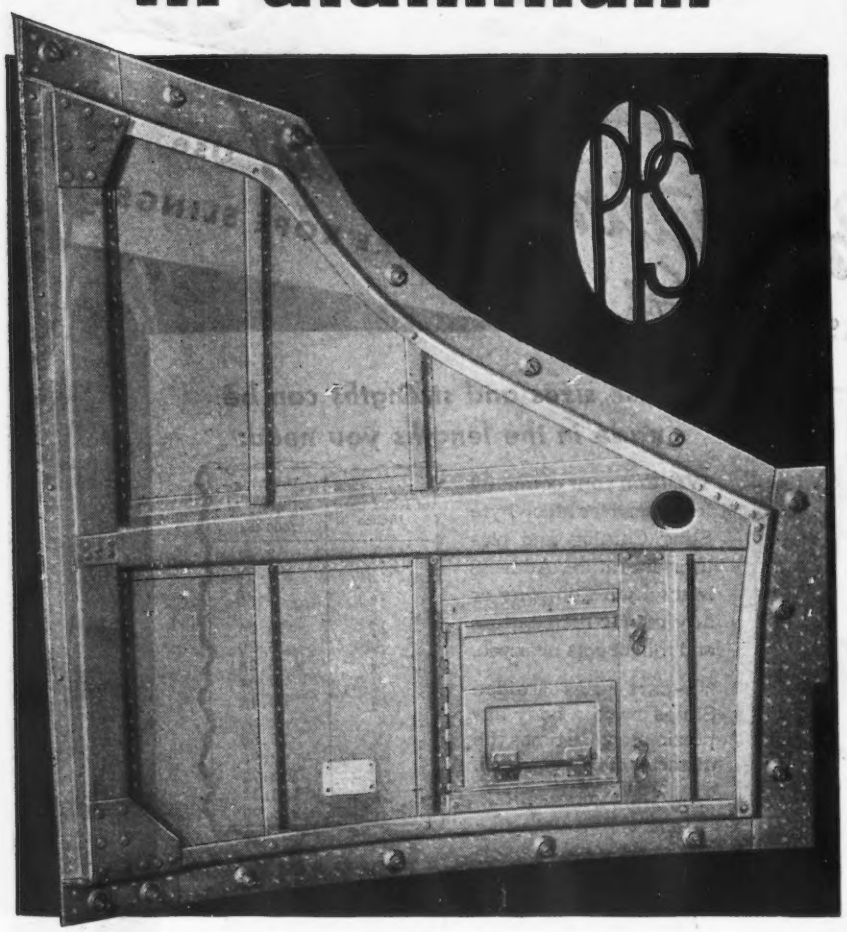

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Western Representative: F. Somers Peterson, 57 California St., San Francisco, Calif.

Ohio Coal Output Equals 1943 Using Fewer Employees

Cleveland

• • • **Ohio's coal mining** industry turned out 31,000,000 tons of coal in 1944, equivalent to production during 1943, but achieved the output with 3800 fewer employees, according to an estimate made this week by a leading coal producer.

This producer estimated that 15,600 employees turned out the coal and earned approximately the same wage total of $40,000,000, which was paid out by the industry to 19,400 employees in the preceding year, an average of $2589 per man, against $2066 in 1943. These figures are unofficial and some operators believe that when official figures are released they will show even greater wage increases.

Two factors contributing to higher efficiency last year were the extension of strip mining, now a subject of considerable controversy, and progress in mechanization of the deep mines.

Sen. Harold Burton (R., Ohio) has termed strip mining operations "one of the great crimes of this generation" and has proposed that $50,000 be given the forest service to study plans to reclaim thousands of acres.

In strip mining, top layers of earth and rock are removed in huge strips, to get at coal or some other mineral, instead of drilling a shaft to reach it. "This method of mining," according to Senator Burton, "is creating a serious problem in Ohio and nearby states where valuable lands are being permanently destroyed."

Senator Burton's request coincided with the testimony of Allen Jordan, executive secretary of the Ohio Valley Conservation and Flood Control Congress.

"Reclamation of open cut or strip mining spoil banks is becoming a matter of widespread public concern," Jordan said.

"In this open cut form of mining, all of the over-burden of soil and rock above the coal deposit is removed and piled to one side in successive ridges of spoil, as the operation moves forward. Past methods, which permitted excavations to a depth of 30 or 40 ft., now are giving way to operations in which the over-burden is being removed to a depth of over 80 ft.

"One shovel at Cadiz, Ohio, which cost $600,000, is as high as a 10-story building. It will lift half of a railroad

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Brad Foote Gears

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HERRINGBONE	2:1 to 295:1
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Brad Foote precision cut gears are made in our ultra modern plant from any practical material in all practical sizes, (spur gears may be cut in diameters up to 108 inches) in any quantity, large or small.

Trained personnel—extensive shop equipment necessary to do all types of special precision gears—large plant capacity assure the prospective buyer maximum results and production in amounts of any proportion.

ARMY E NAVY

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• We were surprised the other day when we counted the different types of springs we make for trucks. There were *more* than a hundred.

The spur of necessity in war time has created new methods and brought about improvements in quality manufacturing which will add greatly to spring performance in the post war years. For more information—

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AMERICAN SPRING OF HOLLY, INC.
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car at one time. It took 63 cars to move and five months to assemble and it operates 24 hours a day. Possibility of using equipment capable of stripping the surface to a depth of 125 ft. now is being explored."

Already about 175,000 acres in Ohio, Indiana, Illinois, Pennsylvania, West Virginia and Kentucky, have been stripped. In Ohio alone, about 20,000 acres already have been strip mined for coal. Estimates vary as to the total area in the midwest to which coal stripping can be applied, but it lies close to 2,000,000 acres.

Batcheller Promises Release of Controls Soon After VE-Day

Cleveland

• • • **Reconversion** will generally follow the line of least resistance through established channels of trade and plans have been worked out accordingly, Hiland G. Batcheller, chief of operations, War Production Board, told the Cleveland Advertising Club recently.

"Just as soon as possible after VE-Day," Mr. Batcheller said, "WPB will start: 1) Doing away with the great bulk of L and M orders. However, on such items as textiles, paper, pulp, chemicals, leather, lumber and tires, restrictions may have to be maintained. 2) Replacing the present preference rating structure with a rating reserved exclusively for direct military requirements, with at most a second rating band for war-supporting or essential civilian activities. All other production would be unrated and would constitute the free market, except insofar as other controls, such as price ceilings, apply. The AAA rating band will be retained for emergencies to break bottlenecks. 3) Open-ending the Controlled Materials Plan so that manufacturers generally will be able to place orders for steel, copper and aluminum, subject only to prior military requirements."

According to Mr. Batcheller, the rise in the output of services will go far to offset the moderate drop in manufacture. Though the decline in munitions manufacturing will run to 35 to 50 per cent, the decline in total manufacturing will be only around 10 to 15 per cent. That is because tire manufacturers will make tires for civilian trucks instead of military buses and passenger cars; because steel will go into refrigerators and highways instead of tanks and warships.

RECENTLY completed studies, embracing *availability of raw materials, markets in the Southeast,* and *labor trained* in many metal working trades, show outstanding opportunities in Alabama for plants making these commodities. The Southeast consumes a minimum of $3,000,000 annually of *each* of these products:

Agricultural machinery; aluminum ware—kitchen and household; bolts, nuts, washers and rivets; blast furnace products; exhaust and ventilating fans; fabricated structural steel; insulated wire and cable; internal combustion engines; laundry equipment; lighting fixtures; office furniture (wood and steel); power boilers and ass'd. prod.; screw machine prod. and wood screws; sheet metal work; steam and hot-water heating apparatus; stoves and ranges (electric); textile machinery; tractors.

Pig iron, steel, aluminum available in practically unlimited supply. Also low-cost power, cheap fuels, excellent distribution facilities from South's center to growing markets.

Specific studies will be made on request to—Dept. I

ALABAMA
STATE PLANNING BOARD
Montgomery 5, Alabama

Certification of Use Required for Cadmium

Washington

• • • New restrictions have been imposed on the use of cadmium in an amendment of Order M-65, effective April 13. All purchasers must now certify that the metal will be used for permitted purposes under the order. Furthermore, producers may not sell cadmium containing or cadmium plated products unless they receive a certification from the purchaser that the cadmium containing item will be used for a purpose allowed under the order.

A small order exemption permitting purchases of 100 lb. of cadmium without WPB authorization has not been changed but spokesmen said that even small order purchases may not be used for other than allowable purposes under the order.

Specific Approvals Required for Copper And Aluminum Sales

Washington

• • • Specific authorization instead of the former blanket permission now is required to sell certain types of aluminum and copper materials on Z-1E orders by a series of amendments to CMP Regulation 4, which defines the operation of preference ratings under the plan. WPB officials said that the changes would make it possible to prevent sale of certain critical items, such as stranded copper wire on Z-1E orders and at the same time free idle and obsolete stocks that cannot be disposed of by warehouses.

Moreover, no person may place orders for delivery of aluminum from warehouse stock in any one month that aggregate more than 10,000 lb. of sheet, strip or plate; 4500 lb. of wire, rod and bar or more than 3000 lb. of tubing, extrusions or structural shapes for delivery at any one time to any one destination. Acceptance of delivery in excess of these amounts is also prohibited. The limitation, however, does not apply to the resale of aluminum obtained by warehouses from surplus inventories under the provisions of Priorities Regulation 13 or WPB Directive 16.

Officials said that these provisions were necessary because the difficulty that has been experienced in getting orders placed on mills has resulted in extreme demands on warehouse stocks. They are designed to permit warehouse purchases, yet prevent ab-

Postwar
PRODUCTION STRATEGY BEGINS HERE!

The costs of material handling are known to be excessive—they add to the price of the finished product but contribute nothing to its sales value. Cut these costs and you gain a tremendously important competitive advantage.

Conveyors and conveyor systems, adapted to your particular operations, speed up material and commodity handling activities, pull handling costs down to an economical level, speed the flow and movements of production. Conveyors handle a wide range of commodities — parts, packages, units, cartons, cans, bottles, barrels, bundles, drums, boxes. They are built in light, average, or heavy-duty types for either portable or stationary use—in a wide variety of sizes, styles and lengths.

Standard builds roller, belt, chain, slat, push bar conveyors; spiral chutes, tiering and lifting machines, portable pilers, and pneumatic tube systems, for every type of material handling and is equipped by experience and facilities to reduce your handling costs with the right type of equipment. Get the profitable answer to your material handling problem today. Write us for Bulletin No. IA-114.

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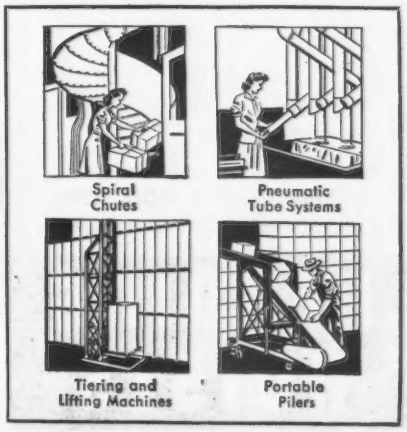
General Offices: North St. Paul, Minn.
Sales and Service in Principal Cities



COURTESY PAN AMERICAN WORLD AIRWAYS

When It's A READING HOIST IT'S RIGHT!

● You get faster, safer handling with *Reading* Hoists. And whether electric or chain type, you can be sure that they will stay on the job! That means less down time, fewer costly repairs. In hundreds of plants *Reading* Hoists are reducing handling costs and getting work done faster. They are safeguarding products ranging from aircraft engines to chemicals and paper products. Rely on *Reading's* long experience in solving many kinds of materials handling problems. On that next job, it will pay you to consult us on your hoist or crane needs. And meanwhile, ask for a copy of "Modern Materials Handling Magic."

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2101 ADAMS STREET READING, PA.

READING HOISTS

normal demands on warehouse stocks during this critical period, WPB officials said.

By another amendment to CMP Regulation 4, the carry-over provisions are changed to prohibit the filling of a steel order more than 60 days after the end of the quarter for which the allotment was issued. No time limitation had been imposed hitherto where an order was accepted within the quarter for which the allotment was issued, the change being made to discourage advance ordering under the provision.

In addition the small free steel provisions affecting stainless steel are reduced from 1000 to 300 lb. and deliveries on Z-1E orders are restricted to steel in inventory more than 120 days. The definition of "distributor" as used in the order has been broadened to include scrap dealers. Also the requirement for certification on Z-1E orders is more clearly stated and a new paragraph was added to clarify the extent to which warehouses may deliver material on toll agreements.

Small MRO Exports Rules Relaxation

Washington

• • • **Exporters may in the future** use preference ratings without filing an application on small orders for materials to be exported for use as maintenance, repair and operating supplies, WPB said on April 13 with the issuance of Order P-151.

Under the order the self rating privilege may be exercised by exporters only under the following conditions: (1) The ratings may be used only to get materials for shipments under a general license of FEA. (2) In any case, the ratings may not be used on purchase orders for materials costing more than $100 for a single foreign consignee. (3) The ratings may be used only if the exporter knows or reasonably believes that the material will be used by the consignee for maintenance, repair and operating supplies, or will be resold by the consignee to an identified customer who will use it for such purpose. (4) The rating may not be used to get items for which blanket MRO ratings are not permitted.

When an exporter is entitled to use a rating under these limitations, he uses the rating that his foreign consignee, or the consignee's customer would be permitted to use under the MRO orders and regulations if he were located in this country.

FOR MORE ACCURATE PRODUCTION GRINDING

USE

OAKITE COOLANT SOLUTION

For wet grinding of all types of steel, many front rank concerns are using grinding coolant solution formulations of Oakite materials to help meet their exacting production requirements . . . to assure closer, more accurate work with smoother, finer finishes.

Oakite grinding coolant solutions provide maximum cooling . . . precise lubricity. Their regular employment assists in keeping wheels clean . . . FREE CUTTING. Wheels require less dressing because loading and glazing are conspicuously reduced.

These outstanding coolant solutions offer distinct advantages in preventing rust, keeping supply tank and lines sanitary . . . odor free. They have high resistance to rancidity and thus prolong solution life.

Complete Data Available!

Specific directions and formulae gladly sent on request. No obligation, of course!

OAKITE PRODUCTS, INC.
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Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE Buy Bonds for Victory
Specialized cleaning
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

Machine Tool Builders Attempt To Formulate Policy on Surplus Disposal

Cleveland

• • • **Shrouded in uncertainty, but posing an ominous question mark on the machine tool industry's postwar horizon, the government-owned surplus (variously estimated at 600,000 units) will soon cease to be a latent enigma and become a basic competitive problem to every machine tool builder.**

Partially in anticipation of this, the National Machine Tool Builders Association met in Cleveland about two months ago to discuss this surplus question as well as certain other basic problems of the industry and ways and means of meeting them in the postwar period. Although no definite plans of action were formulated at that meeting—one of eight held throughout the country—the open-minded policy, easily the most functional solution for the liquidation of the government-owned surplus yet suggested, was outlined to members.

To implement this policy, members of the association offered the services of their own sales outlets to assist users and prospective users of machine tools in the most economically sound selection of production equipment. Their primary objective, of course, will be to sell new machines, but secondarily, they will encourage the purchase of machines from surplus where otherwise nothing could be sold at all.

This procedure will coincide with another of the industry's objectives: Getting rid of the some 683,000 machine tools over 15 years old now in use, and which constitute, in the opinion of at least one of the industry's spokesmen, the actual machine tool surplus.

Generally, machine tool builders look upon the movement of the government-owned surplus as a supplementary activity, but at the same time, raising the standard of efficiency in customers' shops will certainly make for better business in the future. Furthermore, getting out of the way within the next two or three years (an optimistic estimate), the enormous surplus that will compete and depress prices and affect the industry in numerous other ways, will be smart business.

There are still other advantages to the open-minded policy. It should give the customer more confidence in the National Machine Tool Builders Association and minimize "resistance" to salesmen employed by association members. Also, it will keep the industry in closer touch with the actual competitive conditions in the used machinery market, enabling them to more effectively meet such competition.

Let it be understood, however, that the open-minded policy is one of voluntary action and not a commitment in any sense. Since it is not contingent on anything, it is not, obviously, an agreement that has to be followed. And altruistically, it has been pointed out that if one competitor does not subscribe to the policy, it is all the more reason why another should.

In its dissident aspects, the policy is contingent upon one predominant factor—the uncertainty of the government-owned surplus, both in regard to overall number of units, their types and makes, and the condition of the machines offered for sale. Little is known as to how many machines have been scrapped; how many wrecked; how many cannot be rebuilt; how many the Army is going to retain as a strategic reserve; how many are so highly specialized that they cannot be used in time of peace; and how many contractors are going to dump.

Making the policy operative presents another set of problems. One of the proposals at the machine tool builders' meeting was advertising with some reference to the policy adopted by association members. This would seem to be entirely inadequate, since each member who decided to incorporate in his advertising some reference to the policy could be expected to use his own interpretation of the way he will tie into association activity. Result: Lack of a co-ordinating factor. However, the National Machine Tool Builders Association is all set and has a definite plan for selling and advertising, and the only skeptical notes sounded are by those who are wondering if their salesmen are clever enough to carry it out. It has been suggested that the entire program be made an association activity. Obviously, promotional activity by the association would be devoted entirely to the open-minded sales policy of members.

In the long range view, and while the policy is strictly voluntary action, easing an obdurate customer into surplus channels exposes him, whether he recognizes it or not, to the opportunity of a lifetime. Here is his chance to get rid of his relics and pick up first class production equipment at prices never before offered. Only the short sighted are going to feel that these "selfish motives in the public interest" will fail to help industry in the final analysis.

Used machinery dealers, long landing mats for many people, can each perform a useful function and do a great deal to get this surplus into use. There are those dealers, of course, who are not above high pressuring a customer into buying something that shouldn't be bought and whose rebuilding is not always reliable (and very few have any facilities for rebuilding), but there are other dealers, the preponderance of them, who should be recognized and given a chance to do their stuff. The industry will need all available help and the dealer will certainly be able to supply his share.

Every channel, regardless of how small it may be, must be opened up and certainly one of the best ways to get help will be from people in daily contact with the problem. There is some question right now as to the extent to which other builders will be willing to lend a hand and in this regard it is scarcely necessary to point out that whatever action is taken should be started as soon as possible.

Auto Orders Awaited

Cincinnati

• Recent indications of a lift in priority regulations to permit production of some machine tools for auto manufacturers brought a flurry of optimism among district tool builders last week. Local plants have considerable pending business for post-war production and especially from automobile builders.

The extent, of course, is not revealed, but estimates up to $10,000,000 do not bring sharp denials. Heretofore, these have been in the "if as and when" category but presently executives are dusting the orders off in the hope that the "go ahead" signal will be certain. Deliveries on these would not be likely anyway for six or seven months at the earliest since present backlogs are extended well into the latter part of the year.

MACHINE TOOLS

. . . News and Market Activities

Tool Hearings Center of Interest

Cleveland

• • • **Public hearings on surplus** machine tool disposal problems, now underway before the Surplus Property Subcommittee of the Senate Small Business Committee, of which Tennessee Senator Tom Stewart is chairman, are of far-reaching significance to machine tool builders and machinery dealers alike.

If nothing else, these hearings should serve to put the problems of the machine tool industry, and perhaps industry in general, up to Congress in a more comprehensive form than has been the case before. Such a presentation of the actual factors involved may, it is hoped, convince Congress of the necessity for revising the Surplus Disposal Law. And although Congress will probably be very reluctant to do this, it is felt that recommendations of the armed forces will carry more than a little weight.

Some critics have been outspoken in their condemnation of the present law, pointing to the priorities system which, from the point of view of moving surplus machine tools, is ruinous. It has been suggested that the listing of surplus goods for a 30-day period at the end of which they could be sold to anybody would represent at least a partial panacea for all concerned. This, of course, is not according to the letter of the law but would, at least, satisfy its spirit. Whatever the action taken, it will have to be of a sound and functional sort, since disposal of the huge government surplus will certainly be more than a minor factor in the nation's postwar economy.

Another matter of the moment, the automobile orders with their AA-3 priority tags, are coming through nicely, according to reports. But any reports on these orders right now would seem to represent merely a limited cross section of the industry since some builders are frank to admit that their cutbacks have not as yet been sufficient to allow them to start on a program of civilian goods. Certain companies, of course, have had rather considerable cutbacks, but builders of automatic machines sensibly expect that a lot of ammunition is still to be fired before the war is over in the Pacific.

Manpower is still an important factor in any machine tool program and more than one builder here has machines standing idle, simply because they haven't the men to operate them.

Companies do not feel they will be able to get machines for civilian operation before the latter part of the year and seem to feel that something could have been done about this manpower situation long ago—and for that matter, could still be done. Taking skilled men of four or five years' experience who could produce at a high rate of production and then supplying soldiers on furlough to take their place strikes a discordant note with some of the industry.

Perhaps the end of Germany will also mark the end of at least a few of the problems that have been with machine tool builders and dealers since the start of the war. A change in surplus disposal policy would take care of a lot of their problems as would a more realistic estimate of how many machine tools the armed forces are really going to require for successful prosecution of the war with the Japs.

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Trecker Sees High Postwar Production

Milwaukee

• • • **The machine tool trade,** traditional prince or pauper of industry, will not be a postwar pauper even though many so-called experts are pessimistic of its prospects, according to Joseph Trecker, executive vice president of the Kearney & Trecker Corp., Milwaukee, in an interview with the *Milwaukee Journal.*

Mr. Trecker, who is president of the National Machine Tool Builders' Association, expressed this confidence in the face of record breaking production during the war period to speed the manufacture of armament.

Postwar, however, Trecker is confident that the industry will produce at high levels. He figures annual production will be somewhere between $220 million, the 1939 rate, and $460 million, the current value, for the first five years after hostilities cease.

That, of course, is not a huge sum compared to the $1,300,000,000 peak production set in 1943, but it is a lot more than many persons have expected.

"It is estimated that as of Jan. 1, 1940, the manufacturing plants of the United States had 1,008,000 machine tools of all types," he said. "Of these, some 600,000 were more than 10 years old. Adding those built during the war, it is now estimated that our country has about 1,800,000 machine tools."

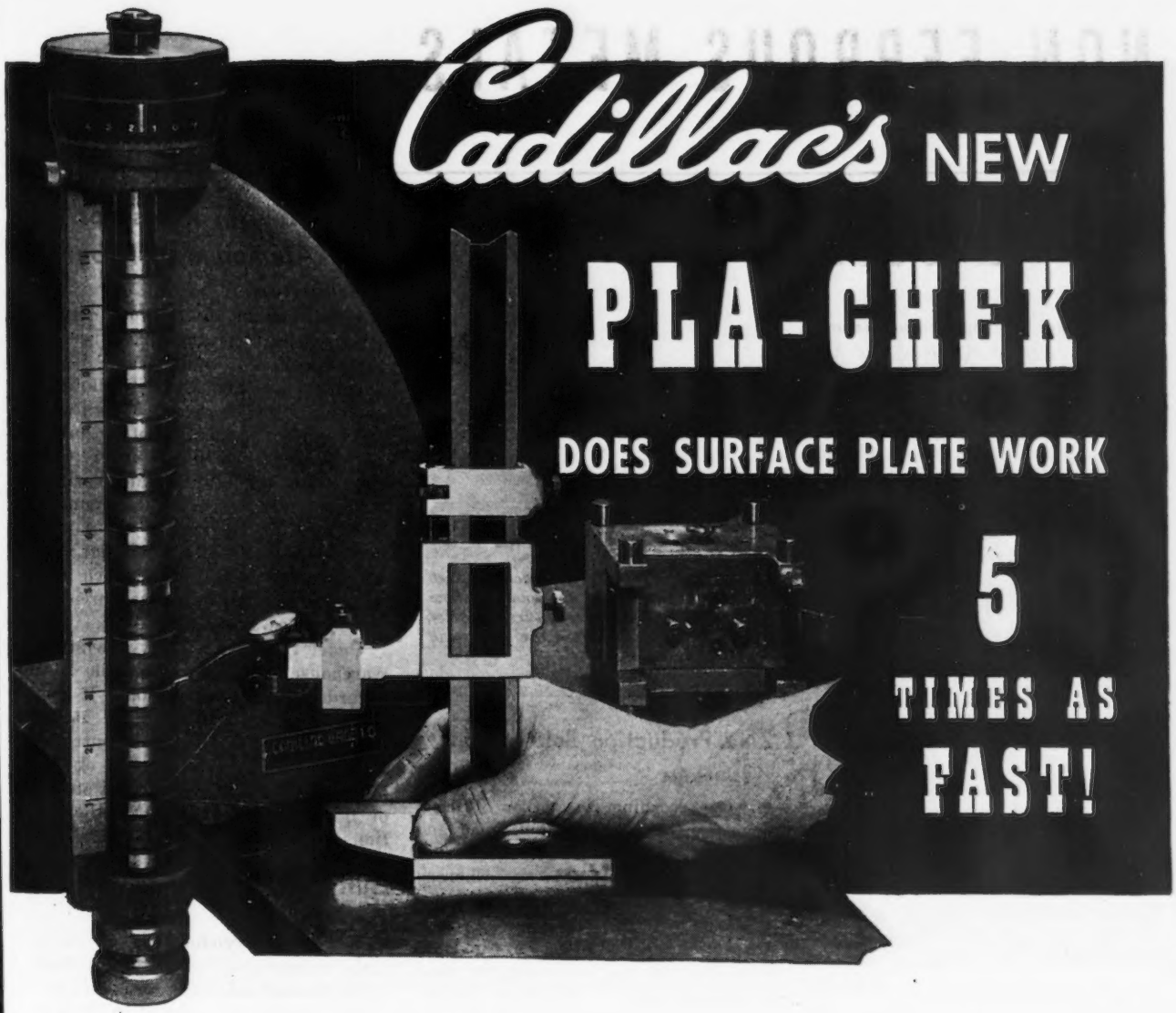
That looks like a surplus sufficient to scare any manufacturer. But Trecker is unimpressed. He points out that the war has lasted long enough to eliminate most of the tools as a surplus factor. They have been used too long and by too inexperienced help to be able to stand much postwar use, he contends. The same condition applies in foreign nations, he adds.

"Consequently it is a safe deduction that normal requirements for machine tools for new uses and replacements will continue at a normal or better than normal basis," Trecker says.

He adds that such nations as France and Russia should provide large export markets as well as South American nations. That he knows whereof he speaks is indicated by the fact that his firm already has contracts for all the machine tools that it can export under immediate priority controls. In addition, seeking to build up postwar exports, Trecker has made two trips to Mexico in the last 18 months to study industry in that country.

Domestically, Trecker as spokesman for the industry, sees some handicaps in postwar production. These, he claims, are the present tax laws which limit depreciation on equipment.

"The present tax structure allowing low depreciation rates is a deterrent to the purchase and use of the most productive equipment available. Speeding up the depreciation rate will speed production and lower costs so that there are more markets and more people employed."



WITH Cadillac's new Pla-Chek you can get out five times as much surface plate inspection work as you do now—and it will be accurate because Pla-Chek is guaranteed accurate to .00005".

Pla-Chek is a hardened steel bar with 12 steps spaced exactly 1" apart; a micrometer screw thread ground on the lower end; a large micrometer thimble graduated in .0001" on the upper end of the bar and a simple triangular-shaped support bracket.

With this bracket set on a conventional surface plate and the micrometer thimble set at zero, the lower end of the bar is exactly level with the surface plate.

The micrometer is then set for the desired dimension in thousandths and tenths of thousandths and the measurement is taken from the desired inch step. Measurements are guaranteed accurate to .00005" for any size from .001" to 12" from the surface of the plate.

TWO WEEKS FREE TRIAL

So that your inspectors can see how much time Pla-Chek will save them, we will send it on two weeks free trial. If this trial satisfies you, send your check, if not, return Pla-Chek express collect and you owe us nothing.

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NON-FERROUS METALS

. . . News and Market Activities

War Needs for Nickel Met by Low-Grade Ore

Toronto

• • • **Nickel and copper production** by the International Nickel Co. of Canada, Ltd., dropped slightly during 1944 to totals of 142,350 net tons and 155,234 tons, repsectively, it was revealed in the annual report to stockholders which attributed the drop in production to manpower shortage at times approximating 13 per cent.

One of the largest extrusion presses in the world has been installed in the rolling mill at Huntington, W. Va., for the production of seamless tubing of Monel, nickel and Inconel. This press, actuated by a force of 5,000 tons, has also been used during the war for the production of 6 and 8 in. copper alloy rotating shell bands in large numbers.

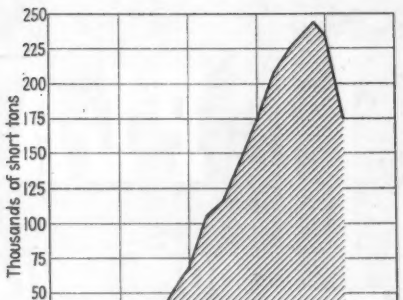
It is reported that the company has been forced to handle enormous tonnages of low grade ore during the war to supply the needs of the United Nations for nickel. Nearly a million feet of diamond drilling has been completed during the past five years in an effort to assure future supplies. Exclusive exploration and mining rights have been obtained in Venezuela, where core drilling and trenching is under way.

Expanded cooperation with producers and consumers of stainless steels is contemplated in postwar activity, and a step in this direction has been the establishment of a new section in its Development and Research Division to develop technical data in the field.

Castings Notice Required

Washington

• • • **Aluminum producers** must give 15 days' notice—five days in the case of castings—to WPB before they schedule the production of orders based on deferred allotments. In directing attention to this fact, WPB said that the purpose is to give it an opportunity to determine if the capacity intended for use for Z-orders can be used to better advantage for production of orders needed for military or essential civilian purposes.



ZINC STOCKS: *U. S. stocks of slab zinc at the end of the quarter show a drastic drop in the first quarter 1945. Statistics from the American Zinc Institute.*

Zinc Production Below Goal

Washington

• • • **According to Myron Trilsch,** deputy director of the Tin, Lead and Zinc Div., the estimated 1945 production of zinc is 916,000 tons whereas estimated requirements for 1945 are 1,116,000 tons. But total January zinc production of 71,834 tons fell considerably short of the 1945 monthly goal of 87,550 tons.

In order to improve production the adoption of a 24 hr. cycle of operations in place of the 48 hr. cycle used by some zinc smelters was urged by the Zinc Labor Advisory Committee at a recent meeting. Committee members said that this would step up production by about 20 per cent, although charging the retorts every 24 hr. might not be as profitable to the companies. WPB officials said that additional manpower would be necessary.

Other recommendations were a minimum 48-hr. work-week and operating all blocks, an incentive plan to cut absenteeism, new equipment and repairs, reduction of hiring standards, and equalization of wage rates.

Assembly Line

Tungsten to Continue Short

Washington

• • • **Tungsten is expected** to remain in short supply even after VE-Day, say WPB officials, and this element likely will continue to be the principal limiting factor in the production of incandescent and fluorescent lamps.

WPB Revises Rules For Aluminum Distributors

Washington

• • • **Aluminum distributors** may no longer sell items that have been in their stocks for more than 15 days on orders bearing the Z1-E allotment symbol, if they have not been able to deliver such items on other orders permitted to be filled under CMP Regulation No. 4, WPB said April 17.

This action was taken in an amendment to CMP Regulation No. 4. Orders bearing the Z1-E allotment symbol are deferred orders which may be placed only on warehouse suppliers of controlled materials.

Under the rules as they now stand, warehouse distributors may file Z1-E or orders for aluminum only if they are acting as agents for the Metals Reserve Co. and received controlled materials forms or shapes of the metal owned by MRC into their stocks, or if they receive special authorization from WPB to do so.

Cuts Back Brass Production

Boston

• • • **Brass production for** small arms ammunition has been cut back by the Springfield, Mass., ordnance district, reducing employment in 12 Connecticut plants to the November, 1944 level. Plants affected are located in Waterbury, Naugatuck, Bristol, Ansonia, Torrington, Bridgeport, and Stamford.

Copper Wire Output Up

Washington

• • • **Production of copper** communication wire has increased 22 per cent in March to a record total of 267,000 miles, WPB officials have revealed to members of the Copper Wire Mill I.A.C. The total production is composed of 64,000 miles of assault wire, 185,000 miles of field wire and 18,000 miles of heavy wire. Officials also disclosed new demands for fine wire between 25 and 36 gage.

Weight limitations on jobber deliveries by a recent amendment to CMP 4, reducing authorized deliveries from warehouse stocks from 3000 lb. of wire to 1000 lb., would serve to increase the difficulties of wire mills by requiring them to handle a host of relatively small orders, industry members argued.

Primary Metals

(Cents per lb., unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.9%, dollars per troy oz.	$4.00
Iridium, dollars per troy oz.	$120.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	$156.00 to $158.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	$6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.37	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52s, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†*(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)*

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.35[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4†

Refinery brass	4.75*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S 25S	5.00
turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S solids	7.50
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.50

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25⅛
Electrolytic	22⅞
Rolled, oval, straight	19⅜
Curved	20⅜
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23⅝
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 1-9 troy oz., per oz.	58*

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver cyanide, 100 oz. lots	—.4179
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 89 per cent, crystals, bbls., frt. allowed	6.35

*Price based on use of foreign silver.

SCRAP

. . . News and Market Activities

Turnings Sell Below Ceilings Everywhere

New York

• • • This week, in markets where all grades have remained at ceiling prices ever since the December rise, prices of blast furnace grades are reported to have dropped. However, the call for open hearth grades remains constant and prices remain firmly at ceilings. It is clear in reports from the districts that steel mill inventories continue at low volume and that open hearth grades must therefore remain in demand for weeks to come.

Dealers continue to bemoan the shortage of scrapyard labor and indicate that with improved transportation facilities normal mill scrap supply could otherwise be assured. This factor has had some influence in determining the type of scrap acceptable to yards and dealers.

Foundry scrap is reported actively sought after in many districts. This type of scrap has been in continual short supply, and even when open hearth grades sold below ceilings continued to warrant the payment of full ceilings by foundries.

Detroit reports some evidence of the effect of contract cutbacks in the reduction of the supply of factory scrap. It would be expected that the earliest indication of such action would be apparent in the Detroit area where scrap production and handling techniques are more highly mechanized than elsewhere.

•

PITTSBURGH—Scrap is moving quite freely in this area, but is being absorbed as fast as it appears on the market. The total quantity moving is tremendous, and the car situation has eased to the point where this movement is being facilitated. Labor, both in mills and scrapyards, is the big problem. In a recent investigation it was evident that there are tremendous quantities of wrecked motor cars in scrap yards, but labor shortages hold up the preparation of this material. Auto graveyards are probably as full today as at any time since the war started.

•

CHICAGO—Prospects of an early end to the European war as yet have not been translated into reduced pressure for deliveries in this market. Orders placed within the past fortnight for the better open hearth grades, including about 15,000 tons from one mill, have induced a firmer tone. An order from the same purchaser for about 10,000 tons of short turnings and mixed borings and turnings has firmed that market as reported last week. Lack of labor, both in yards and mills, apparently indicates that prime scrap is needed and that some delay may be involved in getting material to the charging box stage. The situation is not so urgent as to affect those grades which are selling below ceiling. Some difficulty is reported finding purchasers for railroad specialties.

•

DETROIT — Scrap prices continued steady this week as the new automotive lists began to come in for bids. Supply of factory scrap appears diminished slightly, evidently an immediate result of recent production cutbacks, but other kinds of scrap seem in modestly better supply. Active demand is being manifested for foundry grades.

•

ST. LOUIS—The movement of scrap iron to the St. Louis industrial district has shown some improvement in the last week, as shipments via railroads are being handled more expeditiously following delays caused by high water. Dealers report that labor shortage to process the scrap is still their greatest problem. Mill inventories are reported in good shape, but they still are willing to buy all heavy melting steel offered.

•

BOSTON—The reported withdrawal of the Bethlehem Steel Co. from the market and a drop of 50c. a ton in borings and turnings prices have upset the trade. The general tendency is to sit tight and watch developments, not only so far as borings and turnings go, but heavy melting steel and other material as well. Bethlehem has unfilled orders outstanding against which shipments are being made. The market for foundry grades continues modestly active at ceiling prices, with shipments almost exclusively in truckiots. Most New England yards have comparatively little unprepared scrap on hand, consequently the current uncertainty regarding prices, due to a drop of 50c. a ton in borings and turnings, is not as disturbing as it otherwise might be. Numerous yards report they have been able to obtain additional help. Payrolls are below normal, however. Foundries generally are better off raw materially than in months, having a 60-day supply on hand. If they can get help many will increase production threefold.

•

BUFFALO—Rising receipts of heavy scrap have narrowed the outlet for turnings to some extent but without any noticeable effect on prices being paid by consumers. Allocations of high grade industrial and railroad scrap from outside the district have been a major factor in the increase, including 15,000 tons received so far by lake from Duluth. Demand for foundry specialties has picked up again after a brief let down.

PHILADELPHIA — Mills continue to defer placing new orders for turnings until the expiration of present contracts. Therefore, turnings prices for district sales are purely nominal but turnings sales have been reported to a leading consumer out of the district which would establish a price in the range of $11.25 to $11.75. Open hearth grades are being purchased at ceilings by all mills except Alan Wood, where a strike is in progress. The supply of cast grades continues desperately short.

•

NEW YORK—Turnings buying prices have been lowered in this district by the sole buyer to permit a dealer's buying price of $8.25. This is the first drop away from ceilings since December. Mill inventories are reported to remain low and open hearth grades are in good demand. Dealers say that the movement of scrap is satisfactory and limited principally by the availability of labor.

•

CLEVELAND — There are no scrap price changes here. There have been no sales and dealers report that new orders cannot be had in any sizable quantity as they are still shipping on old orders which are rapidly being cleaned up.

•

CINCINNATI — The market is in a slightly better position after the past week, with virtually all grades moving. More interest is being shown in turnings, which have been pretty much of a drug on the market. Blast furnace material is especially sought, while good steel is still in sharp demand. Heavy contracting is not the order of the day, but mills generally are taking material, and foundries are showing more interest in purchases.

•

BIRMINGHAM — With consumers awaiting further war developments, caution marks scrap purchases in this market. As a number of blast furnaces remained shut down here at the beginning of the week from coal mine strike, heaviest demand was for open hearth material. Only moderate interest was being shown for blast furnace and cast grades and less than that for foundry and electric furnace grades.

Limits MRO Steel For Chemicals

Washington

• • • WPB has issued Direction I to Preference Order P-89 limiting the use of steel for maintenance, repair and operating supplies for the chemical industry in the second quarter to 80 per cent of the quantity used for the corresponding period in 1944. Exempted from the restrictions are companies ordering for second quarter delivery less than 10 tons of carbon steel and two tons of alloy steel.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting		$20.00*
RR. hvy. melting		21.00*
No. 2 hvy. melting		20.00*
RR. scrap rails		21.50*
Rails 3 ft. and under		23.50*
No. 1 comp'd sheets		20.00*
Hand bdld. new shts.		20.00*
Hvy. axle turn.		19.50*
Hvy. steel forge turn.		19.50*
Mach. shop turn.	$13.50 to	14.00
Short shov. turn.	16.00 to	16.50
Mixed bor. and turn.	13.50 to	14.00
Cast iron borings	15.00 to	15.50
Hvy. break. cast.		16.50*
No. 1 cupola		20.00*
RR. knuck. and coup.		24.50*
RR. coil springs		24.50*
Rail leaf springs		24.50*
Rolled steel wheels		24.50*
Low phos. bil. crops		25.00*
Low phos.		22.50*
RR. malleable		22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting		$18.75*
No. 2 hvy. melting		18.75*
No. 1 bundles		18.75*
No. 2 dealers' bndls.		18.75*
Bundled mach. shop turn.	16.25 to	16.75
Galv. bundles	14.25 to	14.75
Mach. shop turn.	9.00 to	9.50
Short shovel. turn.	12.00 to	12.50
Cast iron borings	12.00 to	12.50
Mix. borings & turn.	12.00 to	12.50
Low phos. hvy. forge		23.75*
Low phos. plates		21.25*
No. 1 RR. hvy. melt.		19.75*
Reroll rails		22.25*
Miscellaneous rails		20.25*
Rails 3 ft. and under		22.25*
Locomotive tires, cut		24.25*
Cut bolsters & side frames		22.25*
Angles & Splice bars		22.25*
Standard stl. car axles	23.50 to	24.50
No. 3 steel wheels	22.75 to	23.25
Couplers & knuckles		23.25*
Agricul. malleable		22.00*
RR. malleable		22.00*
No. 1 mach. cast.		20.00*
No. 1 agricul. cast		20.00*
Hvy. breakable cast		16.50*
RR. grate bars		15.25*
Cast iron brake shoes		15.25*
Stove plate		19.00*
Clean auto cast		20.00*
Cast iron carwheels		20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting		$19.50*
No. 2 hvy. melting		19.50*
No. 1 bundles		19.50*
No. 2 bundles		19.50*
Mach. shop turn.	$8.00 to	8.50
Shoveling turn.	9.00 to	9.50
Cast iron borings	8.50 to	9.00
Mixed bor. & turn.	8.00 to	8.50
Low phos. plate		22.00*
No. 1 cupola cast		20.00*
Hvy. breakable cast		16.50*
Stove plate		19.00*
Scrap rails		21.50*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting		$15.05*
No. 2 hvy. melting		15.05*
No. 1 and 2 bundles		15.05*
Busheling		15.05*
Turnings, shovelings	$10.50 to	10.56
Machine shop turn.	8.50 to	8.56
Mixed bor. & turn.	8.50 to	8.56
Cl'n cast, chem. bor.	13.06 to	14.15*

Truck delivery to foundry

Machinery cast	21.00 to	23.51*
Breakable cast	21.57 to	21.87*
Stove plate	20.00 to	23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting		$17.32*
No. 2 hvy. melting		17.32*
No. 1 bundles		17.32*
New busheling		17.32*
Flashings		17.32*
Mach. shop turn.	$9.00 to	9.50
Short shov. turn.	11.00 to	11.50
Cast iron borings	10.00 to	10.50
Mixed bor. & turn.	9.00 to	9.50
Low phos. plate		19.82*
No. 1 cupola cast		20.00*
Charging box cast	18.00 to	19.00
Hvy. breakable cast		16.50*
Stove plate	18.50 to	19.00
Automotive cast		20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting		$18.75*
No. 2 hvy. melting		18.75*
No. 2 bundles		18.75*
Mach. shop turn.	$11.25 to	11.75
Shoveling turn.		15.75*
Cast iron borings		14.75*
Mixed bor. & turn.	11.25 to	11.75
No. 1 cupola cast		20.00*
Hvy. breakable cast		16.50*
Cast, charging box		19.00*
Hvy. axle, forge turn		18.25*
Low phos. plate		21.25*
Low phos. punchings		21.25*
Billet crops		21.25*
RR. steel wheels		23.25*
RR. coil springs		23.25*
RR. malleable		22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting		$17.50*
Bundled sheets		17.50*
Mach. shop turn.	$7.00 to	7.50
Hvy. axle turn.	12.00 to	12.50
Locomotive tires, uncut		20.00
Misc. std. sec. rails		19.00*
Rerolling rails		21.00*
Steel angle bars		21.00*
Rails 3 ft. and under		21.50*
RR. springs		22.00*
Steel car axles		23.50*
Stove plate		19.00*
Grate bars		15.25*
Brake shoes		15.25*
RR. malleable		22.00*
Cast iron carwheels		18.50*
No. 1 mach'ery cast		20.00*
Breakable cast		16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting		$17.00*
No. 2 hvy. melting		17.00*
No. 2 bundles		17.00*
No. 1 busheling		17.00*
Long turnings	$9.50 to	10.00
Cast iron borings	9.50 to	10.00
Bar crops and plate		19.50*
Structural and plate		19.50*
No. 1 cast		20.00*
Stove plate		17.00
Steel axles		18.00*
Scrap rails		18.50
Rerolling rails		20.50*
Angles & splice bars		20.50*
Rails 3 ft. & under		21.00*
Cast iron carwheels	16.50 to	17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting		$20.00*
No. 2 hvy. melting		20.00*
Low phos. plate		22.50*
No. 1 busheling		20.00*
Hydraulic bundles		20.00*
Mach. shop turn.	$13.00 to	13.50
Short shovel. turn.	15.00 to	15.50
Cast iron borings	14.00 to	14.50

NEW YORK

Dealers' buying prices per gross ton, on cars

No. 1 hvy. melting		$15.33*
No. 2 hvy. melting		15.33*
Comp. black bundles		15.33*
Comp. galv. bundles		13.33*
Mach. shop turn.		8.25
Mixed bor. & turn.		8.25
No. 1 cupola cast		20.00*
Hvy. breakable cast		16.50*
Charging box cast		19.00*
Stove plate		19.00*
Clean auto cast		20.00*
Unstrip. motor blks.		17.50*
Cl'n chem. cast bor.		14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting		$19.25*
No. 1 bundles		19.25*
No. 2 bundles		19.25*
No. 2 hvy. melting		19.25*
Mach. shop turn.		13.00
Shoveling turn.		15.00
Cast iron borings		14.00
Mixed bor. & turn.		13.00
No. 1 cupola cast		20.00*
Stove plate		19.00*
Low phos. plate		21.75*
Scrap rails		20.75*
Rails 3 ft. & under		22.75*
RR. steel wheels		23.75*
Cast iron car wheels		20.00*
RR. coil & leaf spgs.		23.75*
RR. knuckles & coup.		23.75*
RR. malleable		23.00*
No. 1 busheling		19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting		$19.50*
No. 2 hvy. melting		19.50*
Compressed sheet stl.		19.50*
Drop forge flashings		19.00*
No. 2 bundles		19.50*
Mach. shop turn.	$12.00 to	12.50
Short shovel.	14.00 to	14.50
No. 1 busheling		19.50*
Steel axle turn.		19.00*
Low phos. billet and bloom crops		24.50*
Cast iron borings	13.00 to	13.50
Mixed bor. & turn.	12.00 to	12.50
No. 2 busheling		17.00*
No. 1 machine cast		20.00*
Railroad cast		20.00*
Railroad grate bars		15.25*
Stove plate		19.00*
RR. hvy. melting		20.50*
Rails 3 ft. & under		23.00*
Rails 18 in. & under		24.25*
Rails for rerolling		23.00*
Railroad malleable		22.00*
Elec. furnace punch		22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$15.50 to	$16.25
No. 1 hvy. melting	15.50 to	16.25
No. 2 hvy. melting	14.50 to	15.25
No. 2 bales	13.50 to	14.25
No. 3 bales	9.50 to	10.59
Mach. shop turn.		7.00
Elec. furn. 1 ft., und.	15.50 to	17.00
No. 1 cupola cast	19.00 to	21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.50 to	$15.50
No. 2 hvy. melting	13.50 to	14.50
No. 2 bales	12.50 to	13.50
No. 3 bales	9.00 to	10.00
Mach. shop turn.		4.50
No. 1 cupola cast	19.00 to	21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting		$14.50
No. 1 hvy. melting		14.50*
No. 3 bundles		11.50
Elec. furn. 1 ft., und.		17.00
No. 1 cupola cast		20.00*

Comparison of Prices . .

Advances Over Past Week in Heavy Type; Declines in *Italics*. Prices are F.O.B. Major Basing Points. The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 144-153.

Flat Rolled Steel: (Cents Per Lb.)	Apr. 24, 1945	Apr. 17, 1945	Mar. 20, 1945	Apr. 25, 1944
Hot rolled sheets	2.20	2.20	2.20	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.65	3.65	3.65	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.20	2.20	2.20	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.80	2.80	2.80	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$43.00	$43.00	$43.00	$40.00
Light rails	43.00	43.00	43.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Latest steel interim price increase authorized by OPA effective Jan. 11, 1945.

Pig Iron: (Per Gross Ton)	Apr. 24, 1945	Apr. 17, 1945	Mar. 20, 1945	Apr. 25, 1944
No. 2 fdy., Philadelphia	$26.84	$26.84	$26.84	$25.84
No. 2, Valley furnace	25.00	25.00	25.00	24.00
No. 2, Southern, Cin'ti	26.11	26.11	26.11	25.11
No. 2, Birmingham	21.38	21.38	21.38	20.38
No. 2, foundry, Chicago†	25.00	25.00	25.00	24.00
Basic, del'd eastern Pa.	26.34	26.34	26.34	25.34
Basic, Valley furnace	24.50	24.50	24.50	23.50
Malleable, Chicago†	25.00	25.00	25.00	24.00
Malleable, Valley	25.00	25.00	25.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡ For carlots at seaboard.
Last pig iron price change authorized by OPA effective Feb. 14, 1945.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$7.00	$7.00
Foundry coke, prompt	8.25	8.25	8.25	8.25
Non-Ferrous Metals: (Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

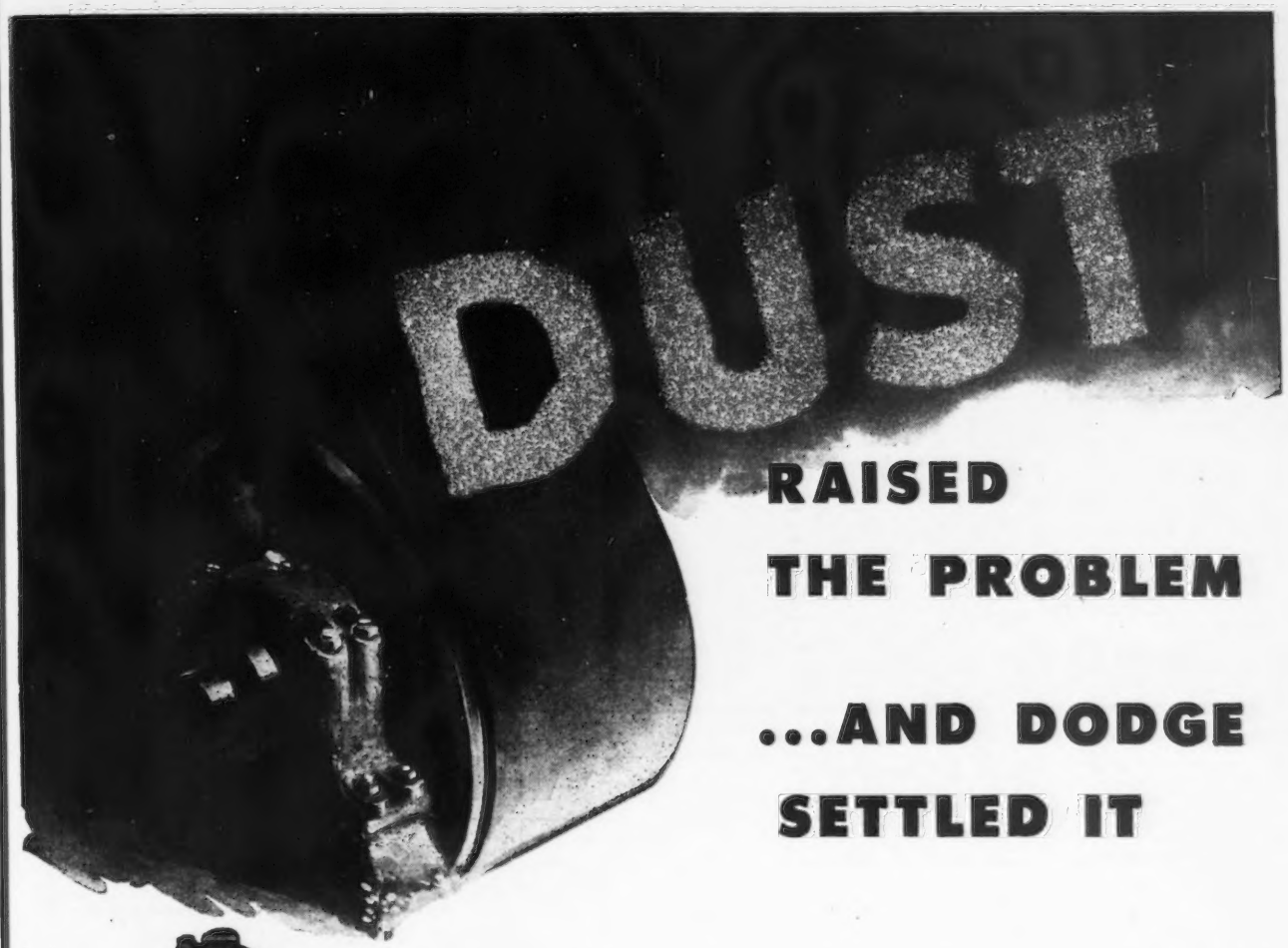
	FINISHED STEEL	PIG IRON	SCRAP STEEL
April 24, 1945	2.25839c. a Lb.	$24.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25839c. a Lb.	$24.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25839c. a Lb.	$24.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.30329c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1945	2.25839c., Jan. 16	2.21189c., Jan. 2	$24.61, Feb. 20	$23.61, Jan. 2	$19.17	$19.17
1944	2.30837c., Sept. 5	2.21189c., Oct. 5	$23.61	$23.61	19.17	$15.67, Oct. 24
1943	2.25513c.	2.25513c.	23.61	23.61	19.17	19.17
1942	2.26190c.	2.26190c.	23.61	23.61	19.17	19.17
1941	2.43078c.	2.43078c.	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c. Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

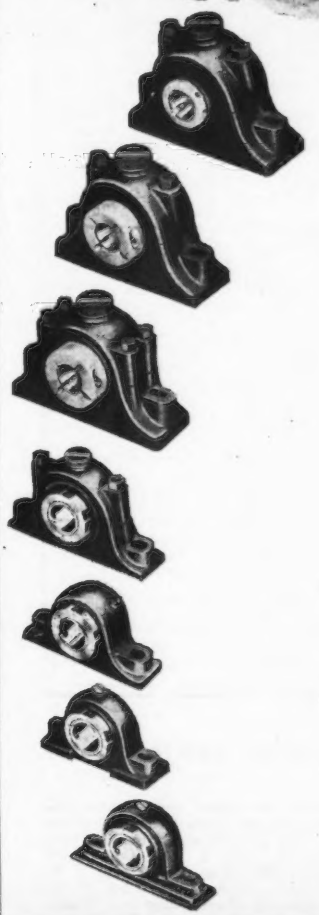
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



RAISED THE PROBLEM ...AND DODGE SETTLED IT



Destructive dust, working its abrasive havoc inside bearings, has been one of industry's toughest problems—especially in steel mills, foundries, cement, gypsum, abrasives, roofing and similar plants. Dodge attacked this problem—*and settled it*—with the Dodge-Timken Type C Bearing. Transmissioneering skill devised a seal which prevents seepage of abrasive dust to the polished surfaces of the bearing.

Now, plants in which these destructive materials are encountered in the manufacturing process can have a smooth flow of power, with a minimum of maintenance. Dodge-Timken Type C Bearings may be literally buried in abrasive dust, yet they operate efficiently, under heavy loads and at high speeds.

Dodge-Timken Type C Bearings are assembled, lubricated and adjusted at the factory. They are available in distributor's stocks. Call the Dodge Transmissioneer in your territory for information about these and other new developments in power transmission equipment, to help increase production efficiency and lower power costs.

DODGE MANUFACTURING CORPORATION
MISHAWAKA • INDIANA

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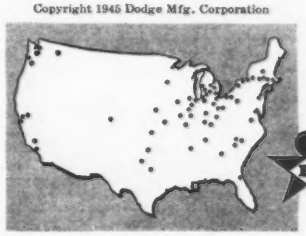

There are 210 Dodge factory graduate Transmissioneers, located in principal cities, to show you new and better ways of transmitting power.

Sign of the Dodge Transmissioneer

DODGE
MISHAWAKA

TRANSMISSIONEERED MEANS ADVANCED DESIGN IN POWER DRIVES

DODGE ROLLING BEARINGS • • • THE 30,000 HOUR LINE

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb. unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes, 25c. above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price for annealed, bright finish wires, commercial spring wire. (15) Deduct 10c. per 100 lb. for plates not produced to sheared mill or universal mill width and length tolerances.

Basing Point / Product	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars [10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold rolled [1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3 05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.65¢	3.65¢	3.65¢		3.65¢	3.65¢	3.65¢	3.65¢	3.75¢	3.65¢		4.20¢		3.89¢	3.82¢
Enameling (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes [2]	3.80¢	3.80¢	3.80¢									4.55¢		4 16¢	4.12¢
STRIP															
Hot rolled [3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled [4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester=3.00¢)					2.90¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester=3.35¢)					3.05¢	3.31¢	
TIN PLATE															
Standard cokes, base box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
Electro, box 0.25 lb.	$4.35	$4.35	$4.35												
Electro, box 0.50 lb.	$4.50	$4.50	$4.50						$4.60						
Electro, box 0.75 lb.	$4.65		$4 65						$4 75						
BLACK PLATE															
29 gage [5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ [12]			3.37¢
TERNES, MFG.															
Special coated, base box	$4.30	$4.30	$4.30						$4 40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth=2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel [6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢ [13]	2.25¢	2.39¢	
Reinforcing (rail) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢ [13]	2.25¢		2.47¢
Cold finished [8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit=2.70¢)			(Toledo=2.80¢)			2.99¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton=2.70¢)					2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3 45¢		
PLATES								(Coatesville and Claymont=2.20¢)							
Carbon steel [15]	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢		2.20¢	2.20¢	2.45¢		2.55¢	2.75¢	2.42¢	2.39¢	2.25¢
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢			(Coatesville=3.50¢)						3.95¢	4.15¢		3 70¢	3 59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem=2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester=3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester=4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester=6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8 35¢			(Worcester=8.55¢)								
WIRE [9]															
Bright [14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester=2.70¢)			(Duluth=2.65¢)		3.10¢			2.92¢
Galvanized	Add proper size extra and galvanising extra to Bright Wire base														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester=3.30¢)					3.70¢			3.52¢
PILING															
Steel Sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6.

Slabs, per gross ton—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50; Kaiser Co. (rerolling) $58.64, (forging) $64.64, f.o.b. Los Angeles.

Blooms, per gross ton—Phoenix Iron Co. (rerolling) $41; (forging) $47; Pgh. Steel Co. (rerolling) $38.25, (forging) $44.25; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth; Kaiser Co. (rerolling) $58.64, (forging) $64.64, (shell steel) $74.64 f.o.b. Los Angeles.

Sheet Bar, per gross ton—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging, per gross ton—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47 mill; Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50; Kaiser Co. $64.64, (shell steel) $74.64, f.o.b. Los Angeles.

Billets, Rerolling, per gross ton—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. 4 in. sq. or larger $37.75, smaller $39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continen-

PRICES

tal Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.60 Birmingham; Ford Motor Co. $34 Dearborn, Mich.; Geneva Steel Co. $58.64 f.o.b. Pacific Coast; Pgh. Steel Co. $43.50; Kaiser Co. $58.64 f.o.b. Los Angeles.

Structural Shapes—Phoenix Iron Co. 2.35c. basing pts. (export) 2.50c. Phoenixville; Knoxville Iron Co. 2.30c. basing points; Kaiser Co. 3.20c. f.o.b. Los Angeles.

Rails, per gross ton—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. 2.65c. mill; Knoxville Iron Co. 2.25c. basing pts.; Kaiser Co. and Geneva Steel Co. 3.20c. Pacific Ports; Central Iron and Steel Co. 2.50c. basing points; Granite City Steel Co. 2.35c. Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, 2.85c. mill; Eckels-Nye Steel Corp. 2.50c. basing pts. (rail steel) 2.40c.; Phoenix Iron Co. 2.40c. basing pts.; Sweet Steel Co. (rail steel) 2.33c. mill; Joslyn Mfg. & Supply Co., 2.35c. Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar), 2.35c. Chicago; Knoxville Iron Co., 2.30c. basing pts.; Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.; Milton Mfg. Co., 2.75c. f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel Corp., Benwood, 2.05c.

Reinforcing Bars—W. Ames & Co., 10 tons and over, 2.85c. mill; Sweet Steel Co. (rail steel), 2.33c. mill; Columbia Steel Co., 2.50c. Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New Engand Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants, f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co., for delivery except Texas and Okla., Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co., shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co., 2.30c. Chicago; Knoxville Iron Co., 2.25c. basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., 2.25c. Parkersburg.

Galvanized Sheets—Andrews Steel Co. 3.75c. basing pts.; Parkersburg Iron & Steel Co., 3.85c. Parkersburg; Apollo Steel Co., 3.75c. basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is 2.45c. per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

Wire Products—Pittsburgh Steel Co., f.o.b. Pittsburgh, per 100 lb., rods, No. 5 to 9/32 in., 2.20c.; rods, heavier than 9/32, 2.35c.; bright wire, 2.725c.; bright nails, 2.90c.; lead and furnace annealed wire, 2.85c.; pot annealed wire, 2.85c.; galvanized barbed wire, 3.90c.; plain staples, 2.55c.; galvanized staples, 2.65c.; bright spring wire, 3.30c.; galvanized spring wire, 3.45c.

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THE THIRD "DIMENSION"

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HEAVY DUTY MATERIALS-HANDLING EQUIPMENT
BENTON HARBOR • MICHIGAN

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	$3.618	$4.872[6]	$5.168[a]	$3.922	$4.772	$3.705	$3.668	$3.822	$4.072	$5.966	$7.066	$7.272	$8.322
New York	3.690	4.613[3]	5.160	3.974[6]	4.772	3.868	3.758	3.853	4.103	5.858	6.908	7.103	8.203
Boston	3.844	4.744[9]	5.374[9]	4.186	4.716	4.012	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.494	4.852	5.044	3.902	4.752	3.694	3.759	3.802	4.052	....	....	....	....
Norfolk	3.871	4.965	5.521	4.185	4.865	4.071	4.002	4.065	4.165	....	....	....	....
Chicago	3.35	4.20	5.381	3.60	4.65[17]	3.65	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.487	4.337[8]	5.422[4]	3.737	4.787[17]	3.787	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.45	4.40	5.027[4]	3.60	4.45	3.50	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.45	4.40	4.904	3.819	4.569	3.73	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.55	4.50	5.154	3.70	4.65[217]	3.709	3.661	3.45	3.80	6.09	7.19	7.189	8.209
Cincinnati	3.526	4.475[3]	4.976[5]	3.675	4.711	3.711	3.691	3.611	4.011	....	....	....	....
St. Louis	3.497	4.347[8]	5.322[4]	3.747	4.931[17]	3.797	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.45	4.40	4.90	3.60	4.45	3.50	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.61	4.48	5.407[4]	3.86	4.35[17]	3.913[3]	3.813[3]	3.763[3]	4.361	6.09	7.19	7.561	8.711
Omaha	3.965	5.443	5.758[4]	4.215		4.265	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.68	3.58	4.718	4.918	3.768	4.88	3.63	3.58	3.98	8.08	7.18	7.18	8.23
Birmingham	3.55	....	4.90	3.70	....	3.65	3.55	3.50	4.43	....	....	....	....
Memphis	4.065[7]	4.68	3.415	4.215	....	4.165	4.065	4.015	4.33	....	....	....	....
New Orleans	4.158[a]	4.95	5.508	4.308	....	4.258	4.158[a]	4.108[a]	4.629	....	....	....	....
Houston	3.863	5.573	6.463[1]	4.313	....	4.35	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.10	7.20[3]	8.25[4]	4.95	5.61[318]	5.05	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.65[14]	7.30[4]	6.50[4]	4.50[14]	7.33[217]	4.75[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.75[12]	7.05[4]	6.10[4]	4.25[12]	....	4.85[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.75[11]	6.60[4]	5.90[4]	4.75[11]	....	4.85[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.63[17]	....	6.32[18]	5.53[17]	....	5.08[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

National Emergency Steels

MILL EXTRAS

Designation	Basic Open-Hearth		Electric Furnace		Designation	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 8612	0.65¢	$13.00	$1.15	$23.00	NE 9427	0.75¢	$15.00	$1.25	$25.00
NE 8615	0.65	13.00	1.15	23.00	NE 9430	0.75	15.00	1.25	25.00
NE 8617	0.65	13.00	1.15	23.00	NE 9432	0.75	15.00	1.25	25.00
NE 8620	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00
NE 8622	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00
NE 8625	0.65	13.00	1.15	23.00	NE 9440	0.75	15.00	1.25	25.00
NE 8627	0.65	13.00	1.15	23.00	NE 9442	0.80	16.00	1.30	26.00
NE 8630	0.65	13.00	1.15	23.00	NE 9445	0.80	16.00	1.30	26.00
NE 8632	0.65	13.00	1.15	23.00	NE 9447	0.80	16.00	1.30	26.00
NE 8635	0.65	13.00	1.15	23.00	NE 9450	0.80	16.00	1.30	26.00
NE 8637	0.65	13.00	1.15	23.00					
NE 8640	0.65	13.00	1.15	23.00					
NE 8642	0.65	13.00	1.15	23.00	NE 9722	0.65	13.00	1.15	23.00
NE 8645	0.65	13.00	1.15	23.00	NE 9727	0.65	13.00	1.15	23.00
NE 8647	0.65	13.00	1.15	23.00	NE 9732	0.65	13.00	1.15	23.00
NE 8650	0.65	13.00	1.15	23.00	NE 9737	0.65	13.00	1.15	23.00
					NE 9742	0.65	13.00	1.15	23.00
					NE 9745	0.65	13.00	1.15	23.00
NE 8712	0.70	14.00	1.20	24.00	NE 9747	0.65	13.00	1.15	23.00
NE 8715	0.70	14.00	1.20	24.00	NE 9750	0.65	13.00	1.15	23.00
NE 8717	0.70	14.00	1.20	24.00	NE 9763	0.65	13.00	1.15	23.00
NE 8720	0.70	14.00	1.20	24.00	NE 9768	0.65	13.00	1.15	23.00
NE 8722	0.70	14.00	1.20	24.00					
NE 8725	0.70	14.00	1.20	24.00					
NE 8727	0.70	14.00	1.20	24.00	NE 9830	$ 1.30	28.00	1.80	36.00
NE 8730	0.70	14.00	1.20	24.00	NE 9832	1.30	28.00	1.80	36.00
NE 8732	0.70	14.00	1.20	24.00	NE 9835	1.30	28.00	1.80	36.00
NE 8735	0.70	14.00	1.20	24.00	NE 9837	1.30	28.00	1.80	36.00
NE 8737	0.70	14.00	1.20	24.00	NE 9840	1.30	28.00	1.80	36.00
NE 8740	0.70	14.00	1.20	24.00	NE 9842	1.30	28.00	1.80	36.00
NE 8742	0.70	14.00	1.20	24.00	NE 9845	1.30	28.00	1.80	36.00
NE 8745	0.70	14.00	1.20	24.00	NE 9847	1.30	28.00	1.80	36.00
NE 8747	0.70	14.00	1.20	24.00	NE 9850	1.30	28.00	1.80	36.00
NE 8750	0.70	14.00	1.20	24.00					
					NE 9912	1.20	24.00	1.55	31.00
NE 9415	0.75	15.00	1.25	25.00	NE 9915	1.20	24.00	1.55	31.00
NE 9417	0.75	15.00	1.25	25.00	NE 9917	1.20	24.00	1.55	31.00
NE 9420	0.75	15.00	1.25	25.00	NE 9920	1.20	24.00	1.55	31.00
NE 9422	0.75	15.00	1.25	25.00	NE 9922	1.20	24.00	1.55	31.00
NE 9425	0.75	15.00	1.25	25.00	NE 9925	1.20	24.00	1.55	31.00

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. **Note 2:** For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, AISI Steel Products Manual. **Note 3:** When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and $5 per gross ton for billets, blooms and slabs. **Note 4:** The extras shown are in addition to the base price of $2.70 for 100 lb. on finished products and $54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports)**

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00

Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., $34.25; Pgh. Steel Co., $33.10.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., $38.10.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00

Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton $54.00

Price delivered Detroit $2.00 higher; East Michigan, $3.00 higher.

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(*No. 5 to 9/32 in.*)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

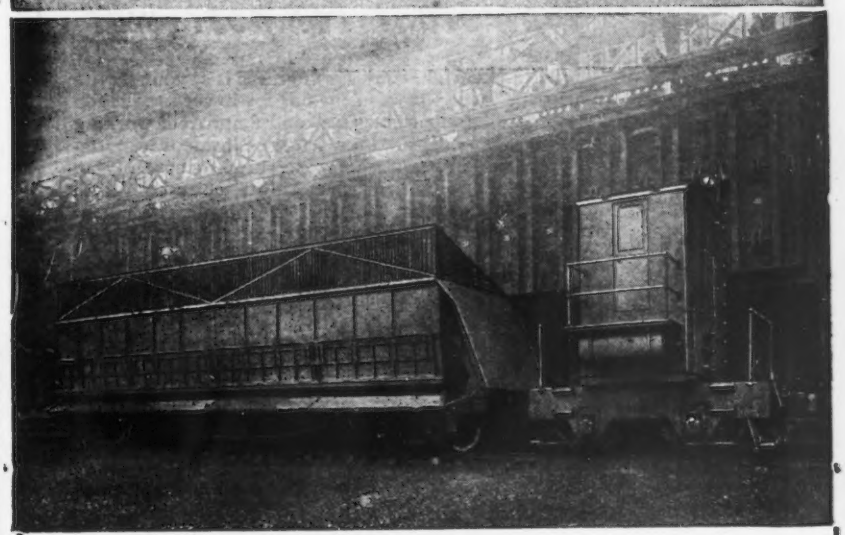
TOOL STEEL

(*F.o.b. Pittsburgh, Bethlehem, Syracuse*)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

COKE OVEN EQUIPMENT



QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

Other ATLAS Products

Ore Transfer Cars
•
Scale Charging Cars
•
Electrically Operated Cars for Every Haulage Purpose

Locomotives for Switching and Interplant Haulage
•
Turntables

The ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1100 IVANHOE RD. CLEVELAND, OHIO, U. S. A.

This man can help you gear your plant for post-war

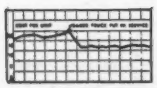
The Baker Material Handling Engineer is at your service to help you meet postwar demands for lower production costs, increased plant capacity and improved working conditions. His intimate knowledge of inside transportation problems—in plant, warehouse, shipping or receiving platforms—enables him to evaluate your complete handling set-up and recommend the proper equipment to achieve objectives listed below, for present or post-war needs.

INCREASED PLANT CAPACITY

Baker trucks can help you multiply the value of plant floor space by tiering material two or three high (or higher), by storing bulky dies or other material in yards or remote areas, by keeping materials moving and machines running for most efficient production.

GREATER MANPOWER EFFICIENCY

Handling materials faster, handling bigger loads, using one man (or woman) with a power truck to do the work of 6 or 8 with hand trucks, getting more out of skilled labor by cutting idle machine time—these are a few of the ways in which Baker Trucks can improve manpower efficiency.



LOWER PRODUCTION COSTS

Since handling of material is not strictly a production operation, it offers one of the best possibilities for savings in overhead cost. Rent costs, machine and labor costs, loading (and unloading) costs, spoilage costs, accident costs—all can be cut by proper use of Baker Trucks.

FASTER DELIVERIES

Streamlining production and movement of material with Baker Trucks can move up delivery dates, shipping and receiving in "unit packages" on skids or pallets means less damage in transit. Faster loading and unloading and better warehouse handling are also important factors.

IMPROVED PLANT SAFETY

Material Handling accidents account for approximately 5 million working days lost annually—about ¼ of the total. Eliminating the handling of heavy objects, overloading hand trucks, improper stacking, and overhead dangers by the use of Baker Trucks, can go far toward reducing this waste.

WRITE FOR YOUR COPY

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Company
2175 WEST 25th STREET • CLEVELAND, OHIO
In Canada: Railway and Power Engineering Corporation, Ltd.

Plant and production managers, traffic managers, superintendents, purchasing agents and any others concerned with material handling will find the new Baker Catalog No. 52 a valuable reference.

Baker INDUSTRIAL TRUCKS

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200.00 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
⅛ in.	63½	51
¼ in.	66½	55
⅜ to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
⅛ in.	24	3½
¼ in.	30	10
⅜ and ½ in.	34	16
¾ in.	38	18½
1 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ in. and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	13
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
⅛ in.	61½	50½
¼ in.	65½	54½
⅜ to 3 in.	67	57
Wrought Iron (Same as Above)		
⅛ in.	25	6
¼ in.	31	12
⅜ to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6 in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pitsburgh, in carload lots.

	Seamless Cold Drawn	*Hot Rolled*	*Lap Weld, Hot Rolled*
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft. and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.80	$3.30
Coated nails	2.80	3.30
Cut nails, carloads	3.85	....
	Base per 100 lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	.67	.35
Fence posts, carloads	.69	.86
Single loop bale ties	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.
†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:
Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 35c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets
(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Per Cent Off List*
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

FORT PITT BRIDGE WORKS

CAN PRESS THEM FOR YOU *IN ONLY ONE OPERATION* WITHOUT WELDING OR FURTHER *FINISHING*

For your present needs, or *peacetime planning* which involve the forming of structural steel, into intricate or difficult shapes, *without welding* or *further finishing*, this amazing production facility will be *a must* on your list.

Hydraulic pressing of long plates in *one operation*, cuts production costs materially and provides a product of uniform accuracy in shape and alignment.

Fort Pitt engineers are available anytime—anywhere to aid in solving any of your large forming or pressing problems.

Illustrated, informative bulletin on request.

THIS IS ONLY ONE OF THE IMPORTANT FORT PITT BRIDGE WORKS FACILITIES THAT ARE AVAILABLE FOR PRESENT OR PEACETIME ECONOMICAL PRODUCTION

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General Offices: Pittsburgh, Pa. *Plant at:* Canonsburg, Pa.

BRANCH OFFICES

NEW YORK, N. Y. . . 441 Lexington Avenue
CLEVELAND, OHIO . . Bulkley Building
COLUMBUS, OHIO . . . Huntington Bank Bldg.
WASHINGTON, D. C. . . . 3069 Cleveland Ave., N.W.
DETROIT, MICHIGAN . . . New Center Building
PHILADELPHIA, PA. . . . Commercial Trust Bldg.

BASING POINT* BASE PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	$25.50	$26.00	$26.50	$27.00	.....
Birdsboro	25.50	26.00	26.50	27.00	$30.50
Birmingham	20.00	21.38	.....	26.00	.....
Buffalo	24.00	25.00	25.50	26.00	30.50
Chicago	24.50	25.00	25.00	25.50	.....
Cleveland	24.50	25.00	25.00	25.50	.....
Detroit	24.50	25.00	25.00	25.50	.....
Duluth	25.00	25.50	25.50	26.00	.....
Erie	24.50	25.00	25.50	26.00	.....
Everett	25.50	26.00	26.50	27.00	.....
Granite City	24.50	25.00	25.00	25.50	.....
Hamilton	24.50	25.00	25.00	.....	.....
Neville Island	24.50	25.00	25.00	25.50	.....
Provo	22.50	23.00	.....	.....	.....
Sharpsville[1]	24.50	25.00	25.00	25.50	.....
Sparrows Point	25.50	26.00	.....	.....	.....
Steelton	25.50	.....	.....	.....	30.50
Swedeland	25.50	26.00	26.50	27.00	.....
Toledo	24.50	25.00	25.00	25.50	.....
Youngstown	24.50	25.00	25.00	25.50	.....

DELIVERED PRICES† (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$ .50	$26.00	$26.50	$27.00	$27.50	.....
Boston	Birdsboro-Steelton	4.02	.....	.....	.....	.....	$34.52
Brooklyn	Bethlehem	2.50	28.00	28.50	29.00	29.50	.....
Brooklyn	Birdsboro	2.92	.....	.....	.....	.....	33.42
Canton	Cleveland	1.39	25.89	26.39	26.39	26.89	.....
Canton	Buffalo	3.19	.....	.....	.....	.....	33.69
Cincinnati	Birmingham	4.06	24.06	25.44	.....	.....	.....
Cincinnati	Hamilton	1.11	.....	.....	26.11	.....	.....
Cincinnati	Buffalo	4.40	.....	.....	.....	.....	34.90
Jersey City	Bethlehem	1.53	27.03	27.53	28.03	28.53	.....
Jersey City	Birdsboro	1.94	.....	.....	.....	.....	32.44
Los Angeles	Provo	4.95	27.45	27.95	.....	.....	.....
Los Angeles	Buffalo	15.41	.....	.....	.....	.....	45.91
Mansfield	Cleveland & Toledo	1.94	26.44	26.94	26.94	27.44	.....
Mansfield	Buffalo	3.36	.....	.....	.....	.....	33.86
Philadelphia	Swedeland	.84	26.34	26.84	27.34	27.84	.....
Philadelphia	Birdsboro	1.24	.....	.....	.....	.....	31.74
San Francisco	Provo	4.95	27.45	27.95	.....	.....	.....
San Francisco	Buffalo	15.41	.....	.....	.....	.....	45.91
Seattle	Provo	4.95	27.45	27.95	.....	.....	.....
Seattle	Buffalo	15.41	.....	.....	.....	.....	45.91
St. Louis	Granite City	.50	25.00	25.50	25.50	26.00	.....
St. Louis	Buffalo	7.07	.....	.....	.....	.....	37.57

* Maximum per gross ton, established by OPA February 14, 1945. † Prices do not reflect 3 per cent tax on freight.

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Delivered to Chicago, $37.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

Silvery iron and **bessemer ferrosilicon** up to and including 14.00 per cent silicon covered by RPS 10 as amended Feb. 14, 1945. Silvery iron, silicon 6.00 to 6.50 per cent, C/L per G.T., f.o.b. Jackon, Ohio—$30.50; f.o.b. Buffalo—$31.75. Add $1.00 per ton for each additional 0.50% Si. Add 50c. per ton for each 0.50% Mn over 1.00%. Add $1.00 per ton for 0.75% or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21½ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh 96 + % Fe	12½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe, carload lots	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh	11½ to 12½c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh	8½c. plus metal
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges.

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PRICES

REFRACTORIES
(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$66.55
First quality, Pa., Md., Ky., Mo., Ill.	52.85
First quality, New Jersey	57.70
Sec. quality, Pa., Md., Ky., Mo., Ill.	47.95
Sec. quality, New Jersey	52.55
No. 1 Ohio	44.30
Ground fire clay, net ton	7.80

Silica Brick

Pennsylvania and Birmingham	$52.85
Chicago District	60.65
Silica cement, net ton (Eastern)	9.25

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$43.00
Angle splice bars, 100 lb.	2.70

(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$43.00
Light rails (from rail steel)	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plate, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

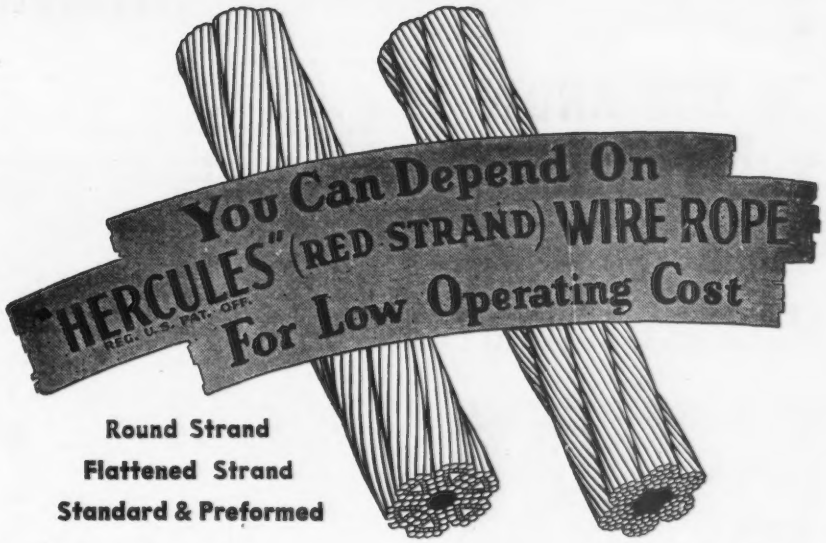
	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS
(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.



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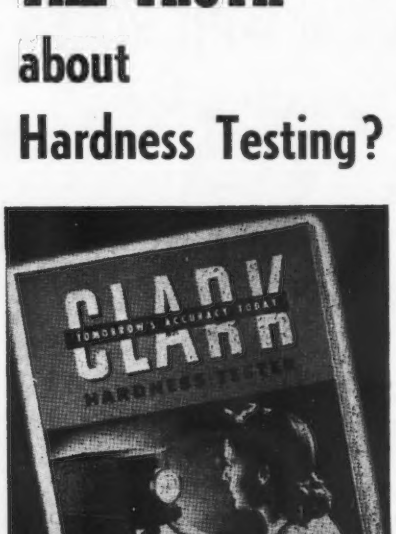

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Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 1c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si.	8.90c.	9.05c.	9.55c.
90-95% Si.	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

Silvery Iron, Silicon 14.01 to 14.50 per cent, $45.50 per G. T. f.o.b. Jackson, Ohio. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10%	13.00c.	13.40c.	14.00c.
62.66% Cr, 5-7% C	13.50c.	13.90c.	14.50c.

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads, Bulk	Ton Lots	Less Ton
0.10% max. C, 1 or 2% max. Si	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.25c.	10.75c.
Less ton lots	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	6.05c.	6.30c.	6.60c.
Ton lots	6.65c.	7.55c.	8.55c.
Less ton lots	6.80c.	7.80c.	8.80c.

Calcium—Manganese—Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carloads	15.50c.	16.00c.	18.05c.
Ton lots	16.50c.	17.35c.	19.10c.
Less ton lots	17.00c.	17.35c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast	Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots	1.80	2.80	5.75

Chromium—Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot	45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.20	$1.2075	$1.229
Less ton lots	1.30	1.3075	1.329

Manganese—Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern Zone	Central Zone	Western Zone
11,200 lb. or more	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more.... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.
- Open hearth $2.70
- Crucible $2.80
- Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal $1.50

Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5 ..... $1.10

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)
- Carload lots ..... 25c.
- 2000 lb. to carload ..... 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)
- Carload lots ..... 58c.
- 2000 lb. to carload ..... 59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis
- No. 1 ..... 87.5c.
- No. 6 ..... 60c.
- No. 79 ..... 45c.

Bortram, f.o.b. Niagara Falls
- Ton lots, per lb. ..... 45c.
- Less ton lots, per lb. ..... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.
- 2000 lb. lots $2.25
- Under 2000 lb. lots $2.30

Ferrotitanium, 40-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti.. $1.23
- Less ton lots $1.25

Ferrotitanium, 20-25%, 0.10%C. max., ton lots, per lb. contained titanium $1.35
- Less ton lots $1.40

High-carbon ferrotitanium, 15%-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload.....$142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton $58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. ..... 80c.

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo..... 80c.

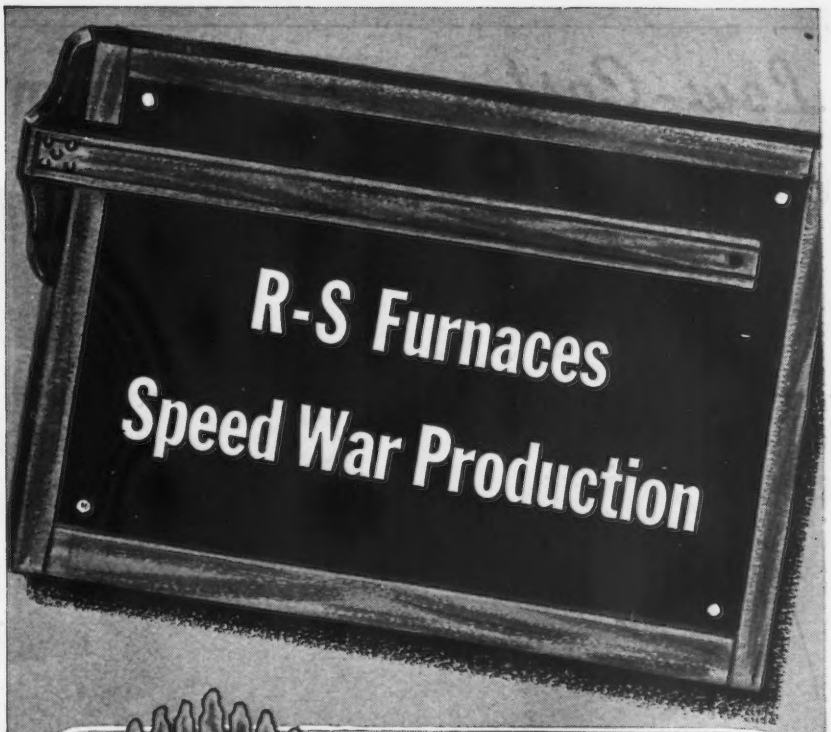
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
- Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy
- Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.
- Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
- Car lots ..... 8.00c.
- Ton lots ..... 8.75c.
- Less ton lots ..... 9.25c.



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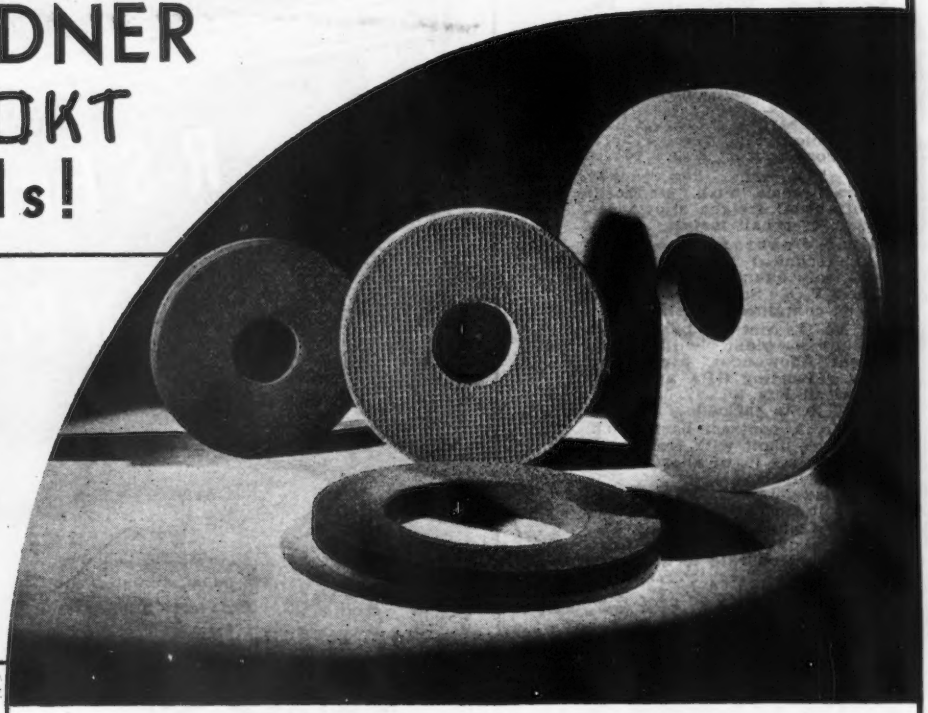

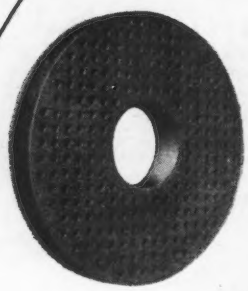

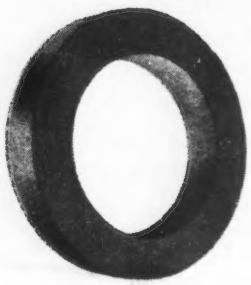

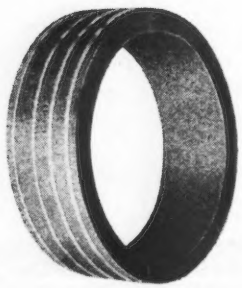

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